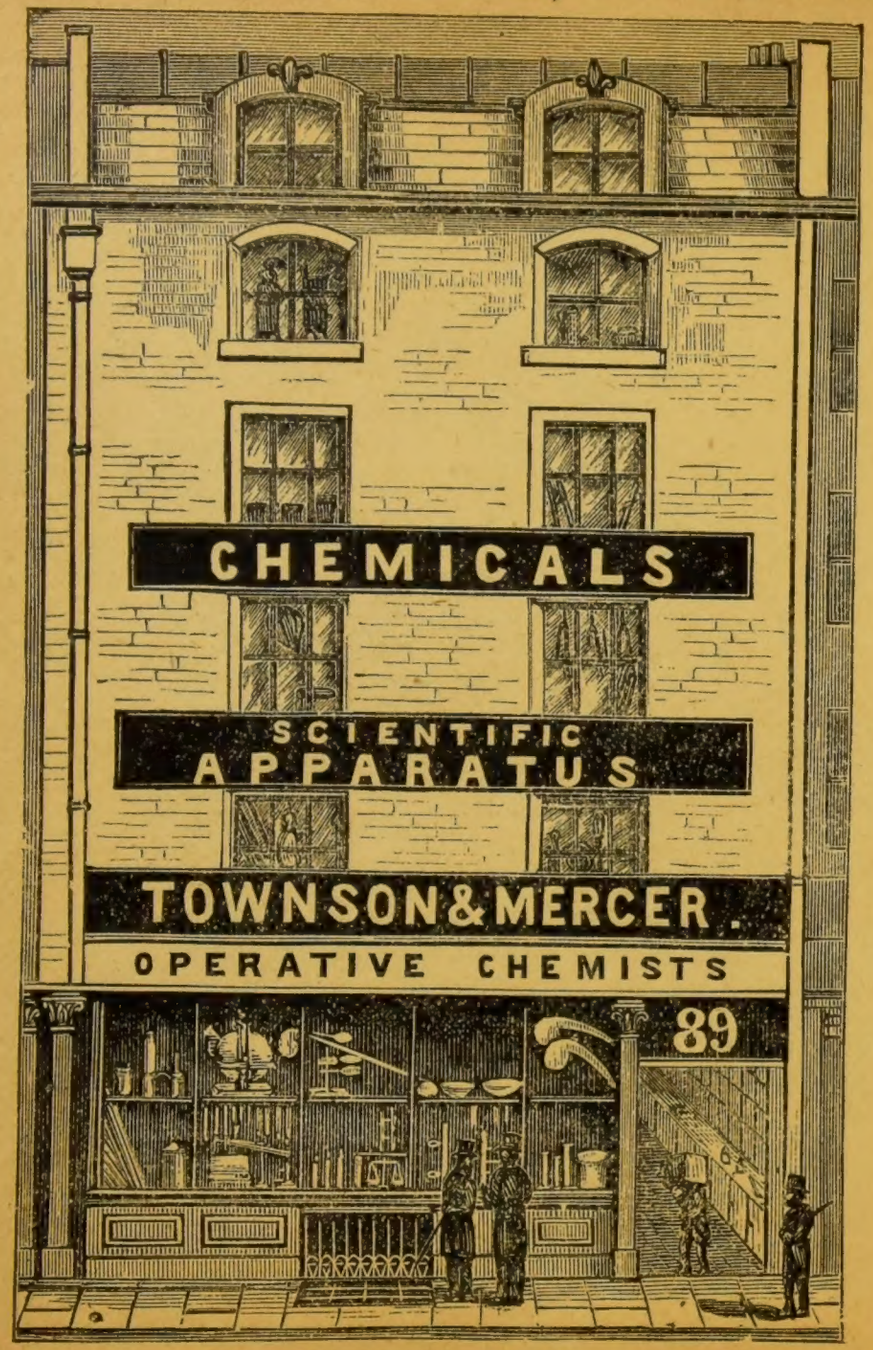
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CHEMICAL APPARATUS

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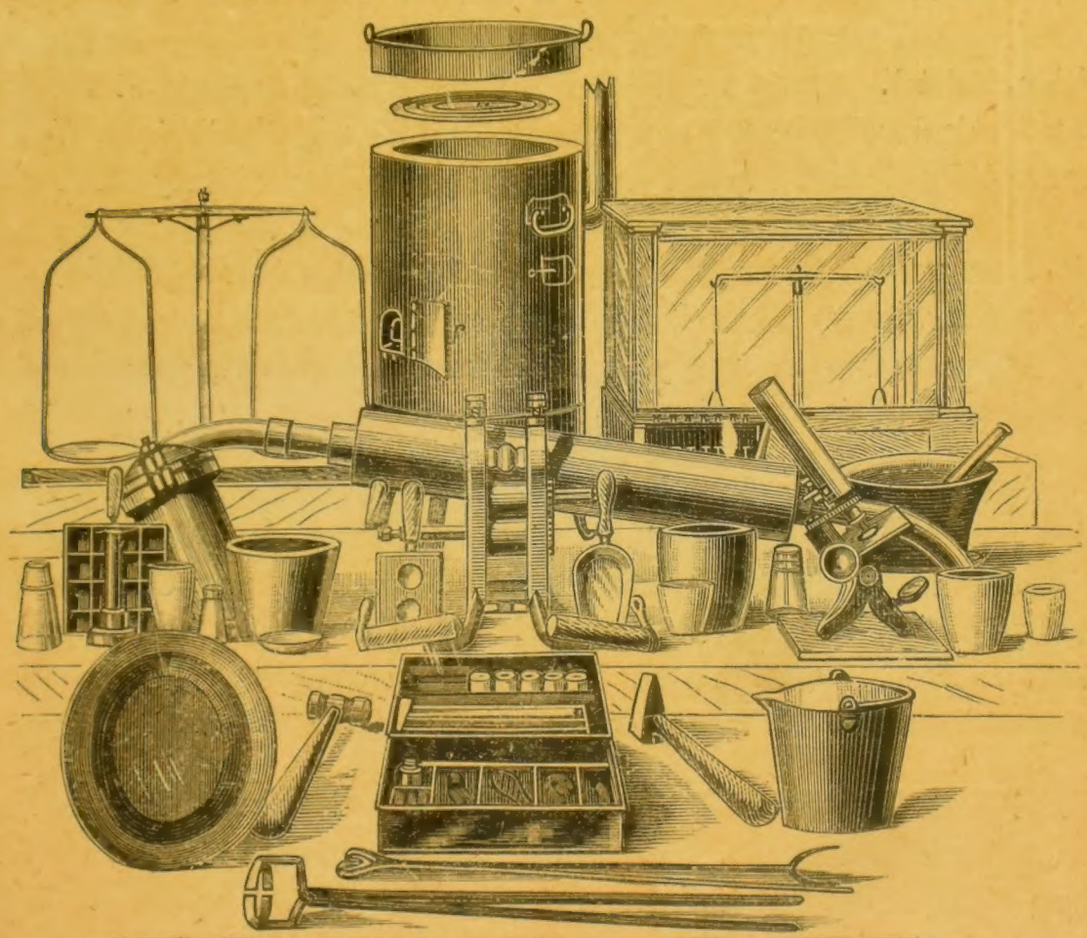
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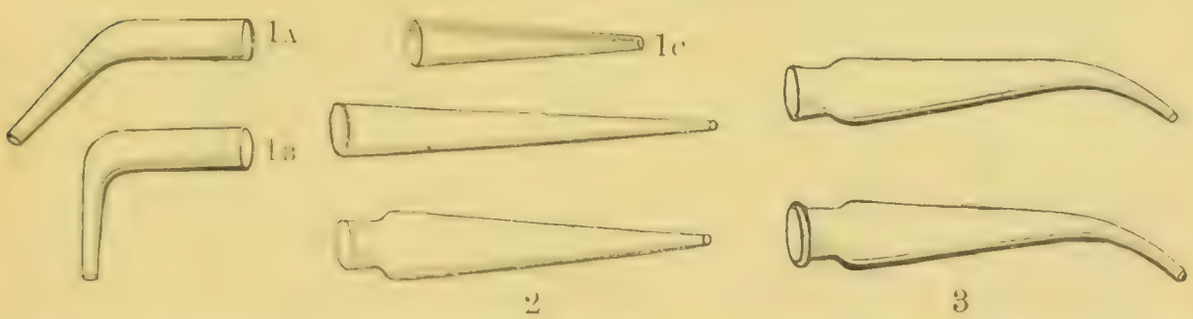
TOWNSON & MERCER'S

Price List

OF

CHEMICAL APPARATUS, &c.

ADAPTERS FOR CONNECTING RETORTS AND RECEIVERS.



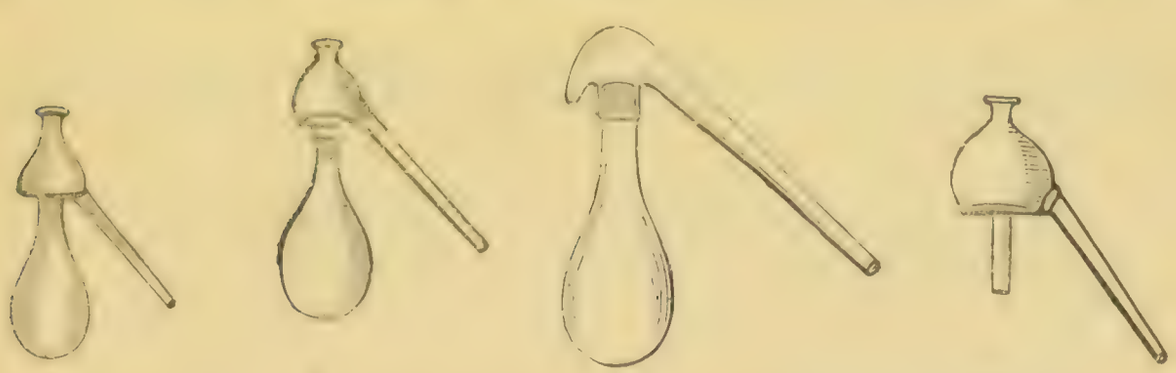
1A & 1B **Adapters,** Small. Internal diameter about $\frac{7}{8}$ in., for Liebig's Condensers, 6d. each.

1C ,, ,, Length 4 in., Blown Glass, for Glass Liebig's Condensers, 4d. each.

2 ,, Straight or with Bulb, internal diameter—

12×1	$15\times1\frac{1}{2}$	$20\times1\frac{3}{4}$	25×2	$25\times2\frac{1}{4}$ inches
6d.	8d.	1/	1/3	1/6 each

3 ,, Bent 8d. 10d. 1/3 1/6 1/9 ,,



1 **Alembics,** Small, Blown Hard Glass. Capacity 4 oz. ... each £0 0 10

5 ,, ,, ,, with Moveable Heads ,, ,, 0 1 0

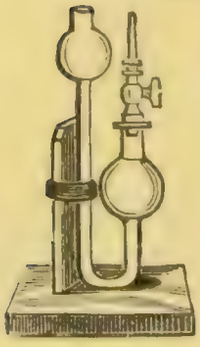
6 ,, Bohemian Hard Glass, Ground and Stoppered—

Capacity 5	10	20	40	60	100 ounces
2/6	3/6	5/	6/	7/	8/ each

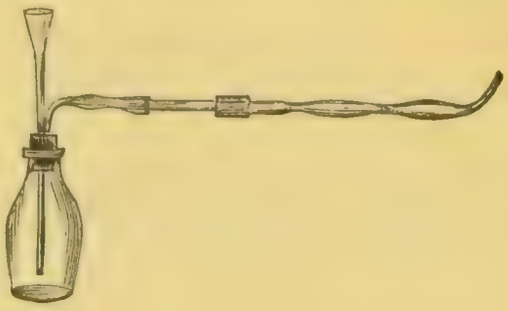
7 ,, Heads to fit Flasks up to 10 oz. ... ... each 0 0 6

8 ,, ,, for Bolt Heads ... ... each 2/6 and 0 3 6

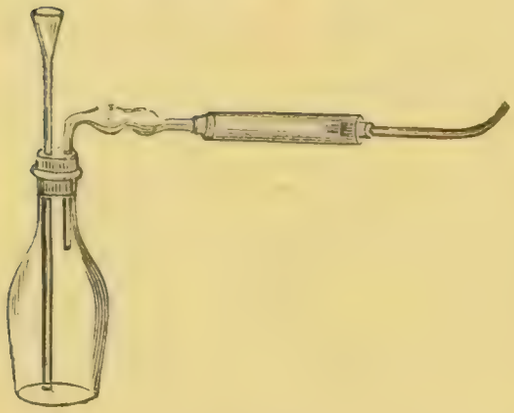
Alkalimeters. *See Graduated Instruments.*



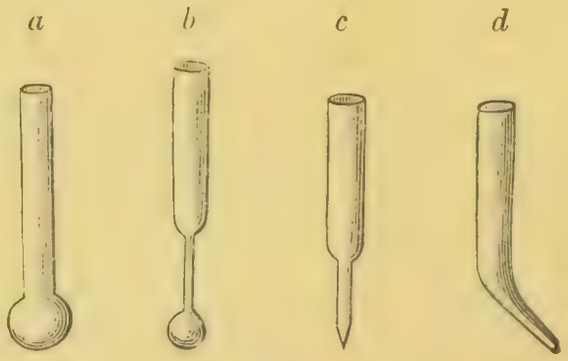
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12



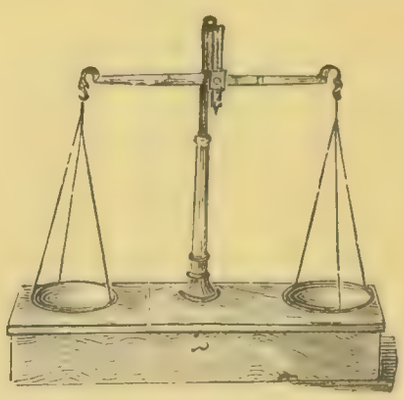
14

9	**Arsenic Apparatus,** Marsh's Complete...	each	£0	5 0
	,, ,, with Platinum Jet		0	8 6
10	,, Tube, only for ditto		0	0 9
11	,, **Apparatus,** Otto		0	2 6
12	,, ,, Berzelius		0	2 6
13	,, ,, Fresenius, similar to above		0	2 3
14	,, Tubes (*a*) Clarke, (*b*) Berzelius, (*c*) Rose, (*d*) Liebig, either shape	per doz.	0	0 10

BALANCES AND SCALES AND WEIGHTS.



15



16

15 **Balances,** Apothecaries', Dispensing or for Rough Weighing, with 6 in. Steel Beam and Brass Weights. ½ grain to 2 drams, in Oak Box.

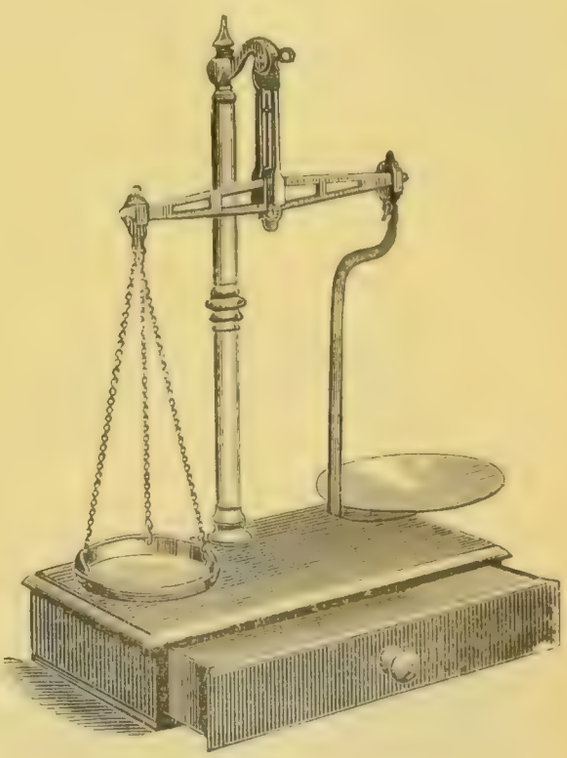
Brass Pans	each	£0	2 9
Glass Pans	,,	0	3 6

15A **Balance,** Same as above, with 6 in. Brass Beam, Brass Pans and Weights. ½ grain to 2 drams, in Wood Box, each £0 2 0

16 ,, Brass Pans, 6 in. Hook End Steel Beam, with Brass Pillar, on Oak Stand, with Drawer 0 6 6



19A



20

19A **Balance** (Counter Scales), on Polished Mahogany Board, with 10 in. Brass Box End Beam £1 15 0

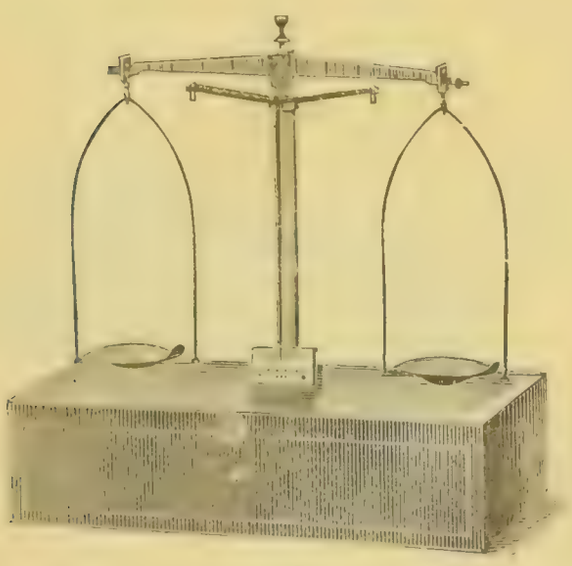
20 ,, (Counter Scales), Brass Pillar on Polished Mahogany Stand, with Drawer, Beam 10 in., Box Ends on Agates, to carry 1 lb. in each Pan 2 2 0

21 **Balances,** On French Polished Box, with Drawer, Drop Lever, Steel Knife Edges, Needle Pointer, Brass Beam 9 in., and Box, Moveable Pans 2½ in., with Weights on Block in Drawer 300 grains to $\frac{1}{10}$th, sensible to $\frac{1}{50}$th grain (similar to Fig. 23) 2 0 0

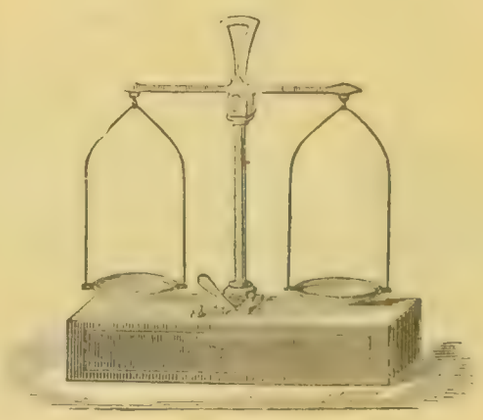
22 ,, Do. do., with Weights 50 grammes to 1 centigramme, sensible to 1 milligramme 2 0 0

CHEMICAL BALANCES MANUFACTURED BY BECKER'S SONS, ROTTERDAM.

The highest distinction, "Diplome d'Honneur," was awarded at the International Exhibition, Amsterdam, for accuracy and superiority of Workmanship. These Balances are in use in the Oxford, Cambridge, London, Tokio Universities, &c., &c., the College de Pharmacie du Museum d'Histoire Naturelle, &c., &c., Paris, and the principal Universities, Colleges, and Scientific Laboratories in the United States of America, Canada, India, and Great Britain and Ireland.



23



23A

23 **Balances,** Prescription Scales, on French Polished Box with Drawer, Drop Lever, Steel Knife Edges, with support for Beam, and Needle Pointer, Brass Beam, Bows, and Moveable Pans—

Nos. ...	27	30	32	
To Weigh	50	100	250	grammes
Sensible to	1	1	2	milligrammes
Prices ...	£1 11 8	£1/18/4	£3/10/0	

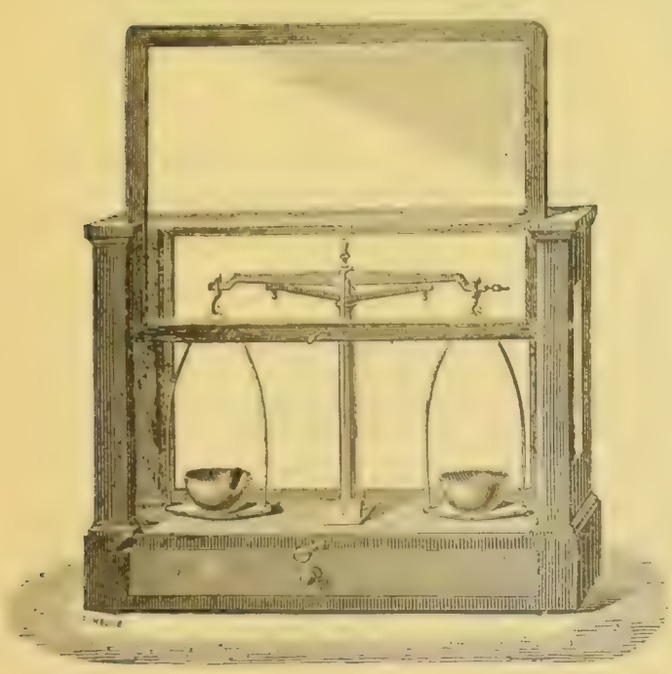
The No. 32 is fitted with Set Screws and Level.

23A **Balances,** On French Polished Box, with Drawer—

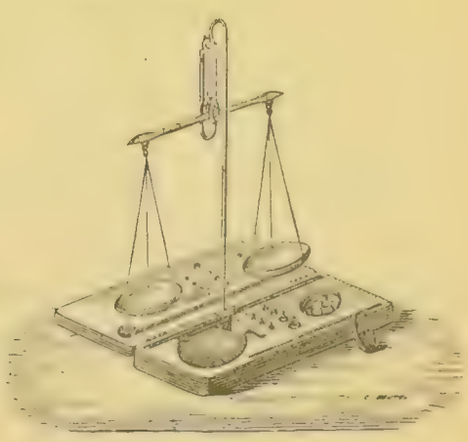
Nos.	76	77
To Weigh ...	30	100 grammes
Sensible to ...	2	5 milligrammes
Prices... ...	17/	£1/0/6

No. 78, same as No. 76, but in Polished Mahogany Case, with Sliding Frame... ... ... £1 11 8

No. 79, same as No. 77, ditto 1 15 0



24



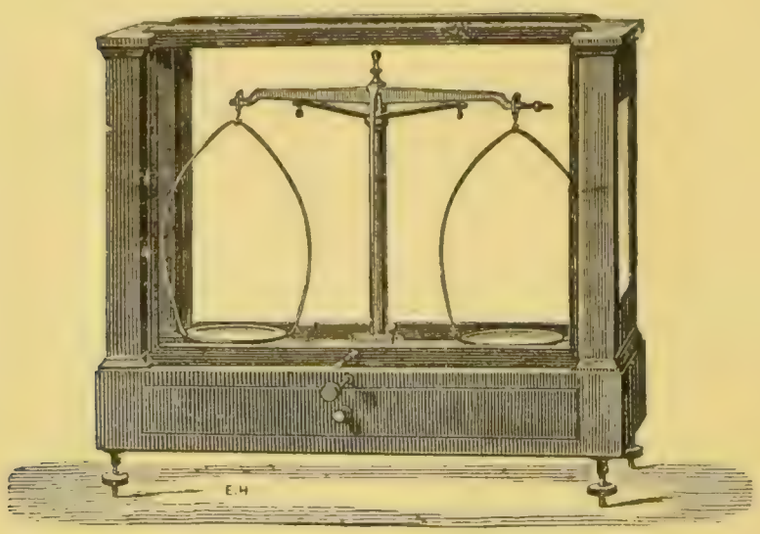
27

24 **Balance,** Student's Chemical, No. 69, in French Polished Mahogany Glass Case, with Counterpoised Front Sliding Frame, Drop Lever, Steel Knife Edges, and Needle Pointer, with Nickel Plated Pans, to carry 30 grammes in each Pan, and turn to half a milligramme £2 10 0

27 ,, Pocket Balance, No. 73, to weigh up to 10 grammes, sensible to 2 milligrammes, with Weights, 5 grammes to 2 milligrammes 1 0 0

,, No. 75, to weigh up to 10 grammes, sensible to 2 milligrammes, on Mahogany Stand 0 12 6

,, Diamond Balance, No. 80, in French Polished Mahogany Box, and Drawer, with Pillar, can be charged up to 64 carats in each Pan, sensible to $\frac{1}{64}$th carat, with set of Weights, 64 carats down to $\frac{1}{64}$th carat 1 2 6



30

30 **Balance,** No. 28, in French Polished Mahogany Glass Case, with Counterpoised Front Sliding Frame, Brass Pans, &c., for a charge up to 50 grammes in each Pan, sensible to ½ milligramme with its full charge £2 16 8

,, No. 28A, Beam divided at one end with Rider Apparatus and 2 Riders 3 11 8

,, No. 29, ditto, ditto, provided with Set Screws and Level ... 3 10 0

,, No. 29A, Beam divided at one end, with Rider Apparatus and 2 Riders... ... ... 4 5 0

,, No. 31, in French Polished Mahogany Glass Case, &c., as No. 28, but larger, for a charge up to 100 grammes in each Pan, sensible to 1 milligramme 3 10 0

,, No. 31A, ditto, ditto, provided with Set Screws and Level ... 4 0 0

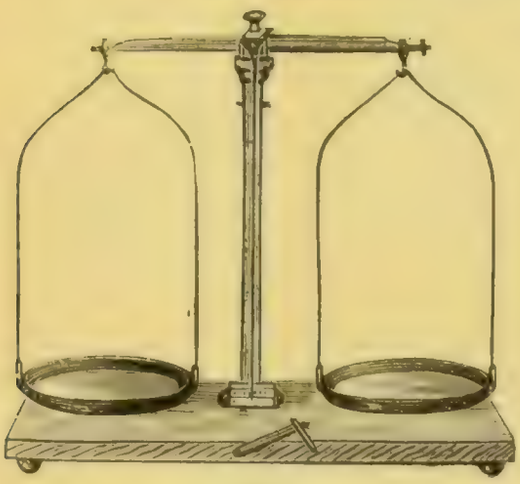
,, No. 33, in Polished Mahogany Case, to carry 250 grammes in each Pan, sensible to 1 milligramme 4 8 6

,, No. 35, ditto, to carry 500 grammes in each Pan, sensible to 5 milligrammes 5 16 8

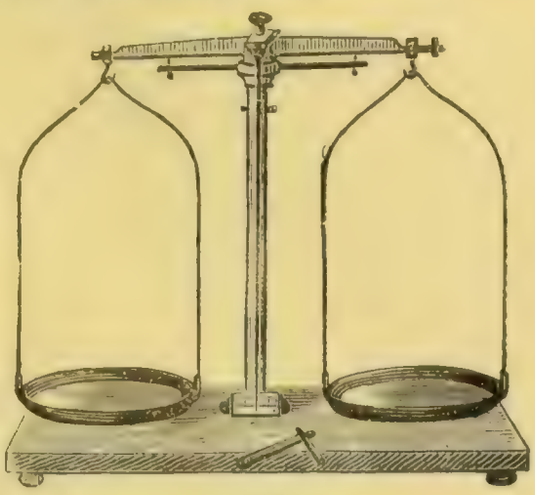
,, No. 37, ditto, to carry 1½ kilos in each Pan, sensible to 10 milligrammes 8 0 0

For a more extended List of Bullion and other Balances, see Becker's Sons' Special List, to be obtained on application to Messrs. Townson & Mercer.

FOR APOTHECARY, GOLD, SILVER, AND OTHER PURPOSES WHERE ACCURACY IS REQUIRED.



40



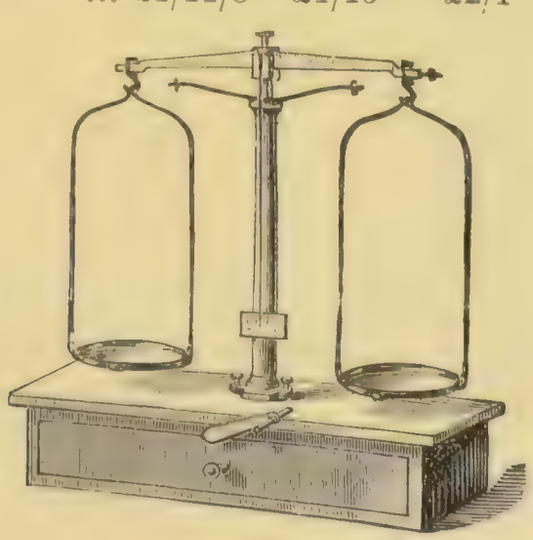
44

40 **Balances,** On a French Polished Board, Steel Knife Edges, and Needle Pointer, Brass Beam, Bows, and Moveable Pans—

Nos.	49	50	51	52	
To Weigh ...	100	250	500	1000	grammes
Diam. of Pans	8	10	12	15	centimetres
Sensible to ...	5	10	15	20	milligrammes
Prices ...	£1/10	£1/13/4	£1/17/6	£2/1/8	

44 ,, On a French Polished Board, provided with support for Beam, Drop Lever, Steel Knife Edges, and Needle Pointer, Brass Beam, Bows, and Moveable Pans—

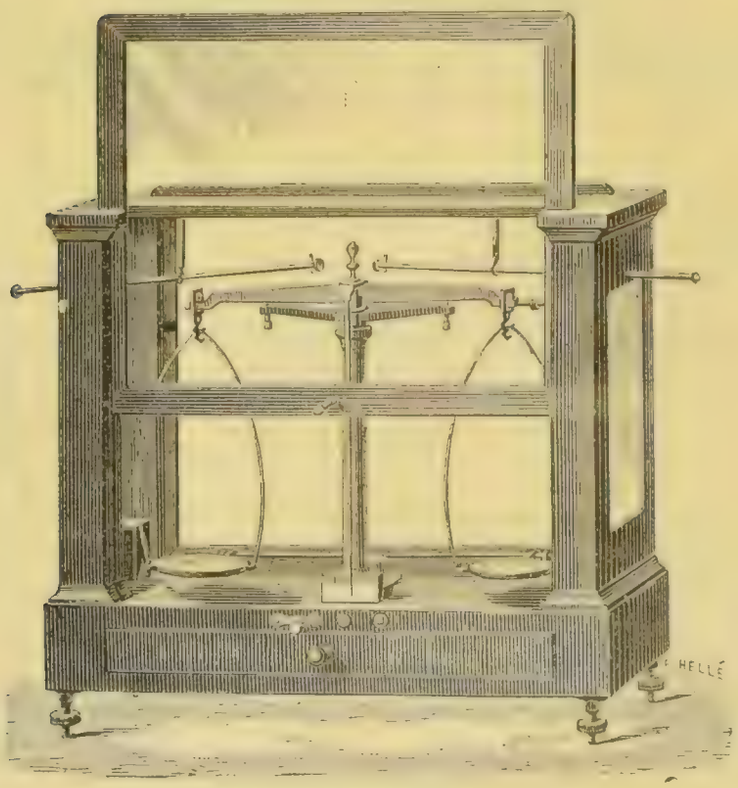
Nos.	65	66	67	68	
To Weigh ...	100	250	500	1000	grammes
Diam. of Pans	8	10	12	15	centimetres
Sensible to ...	5	10	15	20	milligrammes
Prices ...	£1/11/8	£1/15	£2/1	£2/5	



48

48 **Balances,** On French Polished Box, with Drawer, and Marble Top, Beam Support, and Steel Knife Edges. (See Illustration, page 7.)

Nos.	68 J	68 K	
To Weigh	500	1000	grammes
Diam. of Pans ...	12	15	centimetres
Sensible to	15	20	milligrammes
Prices	£2/10	£2/15	



49. Fig. 3.

49 **Balances,** No. 6, Analytical, for a charge up to 50 grammes in each Pan, in French Polished Glass Case, Front Sliding Frame Counterpoised, Beam divided on both sides to ½ part of milligramme, with new improved arrangement for arrest of Pans. Provided with Wood Stand for taking Specific Gravity, Agate Bearings, and sensible to ⅕th part of a milligramme with its full charge, Pans 6 centimetres in diam. Pans and Bows Nickel Plated, provided with two Rider Apparatus £7 1 8

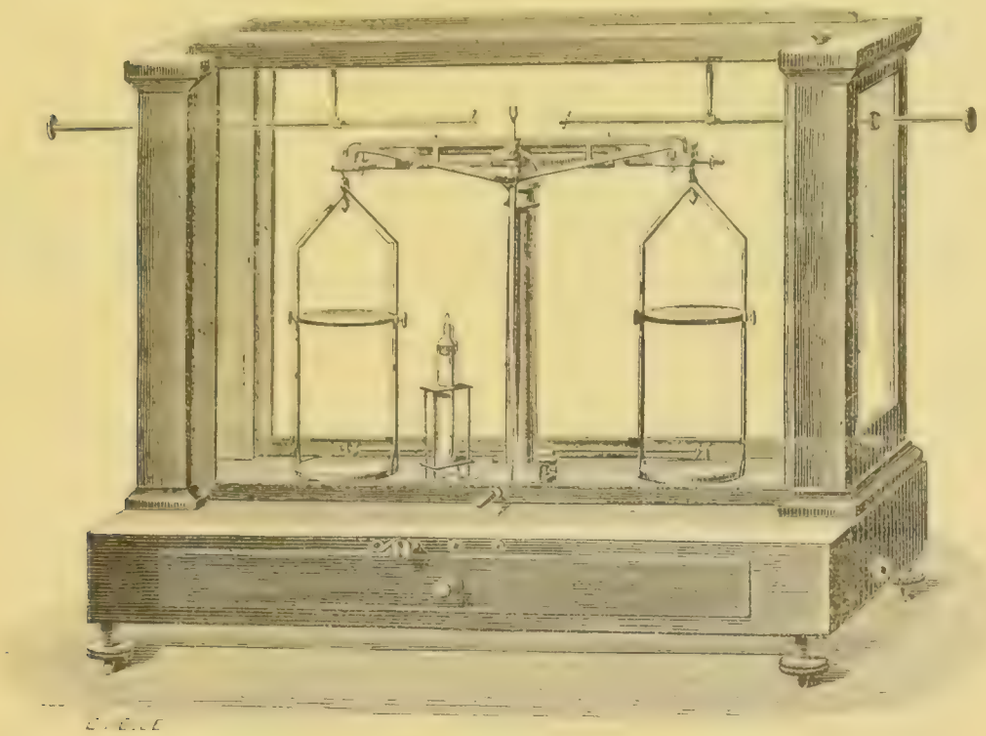
„ No. 7, ditto, ditto, with one Rider Apparatus 6 10 0

„ No. 8, for 50 grammes, with one Rider Apparatus, but without new improved arrangement for arrest of Pans 5 15 0

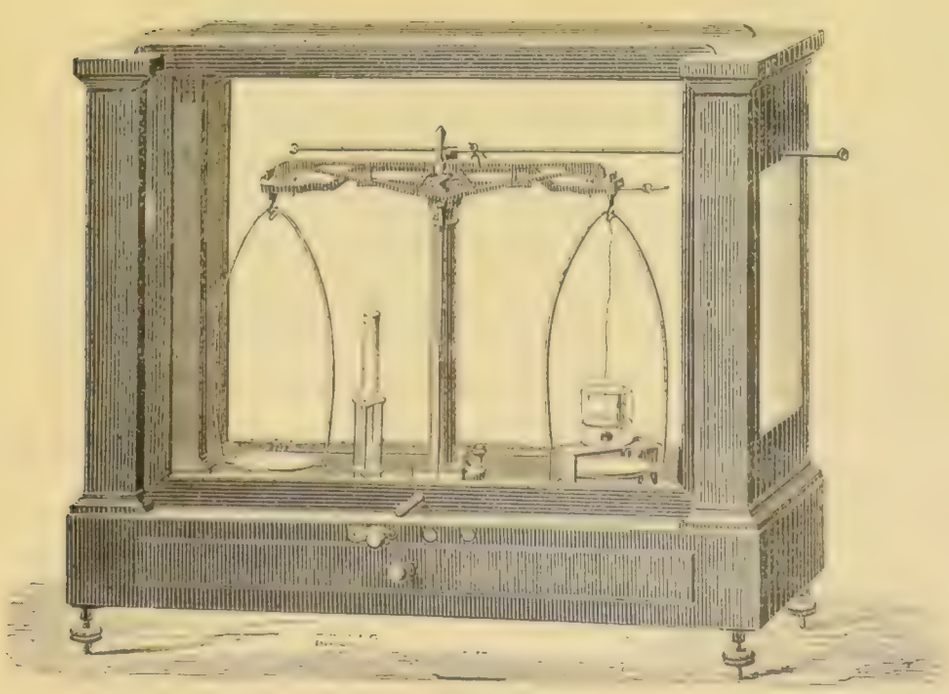
Balances, No. 9, for 50 grammes, without Rider Apparatus, and without new improved arrangement for arrest of Pans £5 0 0

„ No. 10, the same as No. 6, for a charge up to 100 grammes in each Pan. Sensible to $\frac{1}{5}$th part of a milligramme with its full charge, Pans $7\frac{1}{2}$ centimetres in diameter. Pans and Bows Nickel Plated, provided with two Rider Apparatus 8 6 8

„ No. 11, for 100 grammes, with one Rider Apparatus, ditto ditto 7 15 0



54. Fig. 4.



54. Fig. 5.

54 **Balances,** No. 17, for a charge up to 100 grammes in each Pan, in French Polished Glass Case, Front Sliding Frame Counterpoised, Agate Planes, with new improved arrangement for arrest of Pans and Beam, sensible to $\frac{1}{20}$th milligramme with its full charge. Provided with Apparatus for Specific Gravity, Rider and Weighing Tubes. Beam divided into $\frac{1}{10}$th milligramme, Pans $7\frac{1}{2}$ centimetres in diameter £13 11 8

,, No. 18, with Agate Knives 14 11 8

,, No. 19, for 200 grammes in each Pan, sensible to $\frac{1}{20}$th milligramme with its full charge, provided with improved arrangement for arrest of Pans, Apparatus for Specific Gravity, Rider and Weighing Tubes. Beam divided into $\frac{1}{10}$th milligramme 16 6 8

,, No. 20, with Agate Knives 17 6 8

,, No. 21, same as No. 19, with adjustable Shelf for Specific Gravity 18 1 8

59 ,, No. 22, for scientific use, for a charge up to 500 grammes in each Pan, sensible to $\frac{1}{10}$th milligramme with its full charge. Agate Planes, provided with Arrest for Pans and Beam, Apparatus for taking Specific Gravity, Rider and Weighing Tubes. Beam divided into $\frac{1}{10}$th milligramme, Pans $10\frac{1}{2}$ centimetres in diameter 20 16 8

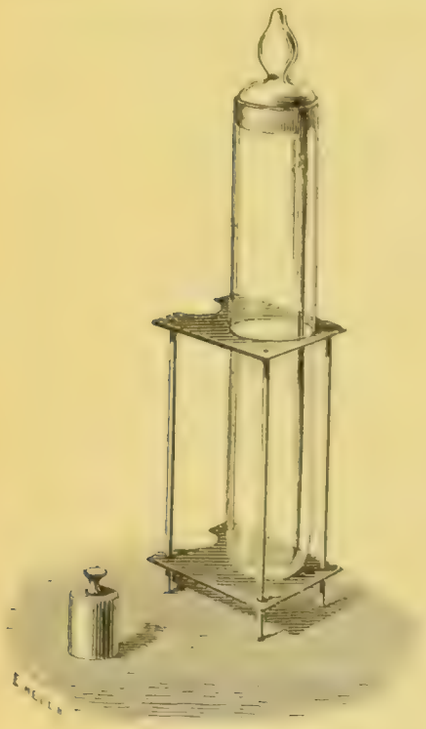
60 ,, No. 23, ditto, ditto, with Agate Knives 21 13 4

61 ,, No. 24, ditto, ditto, with adjustable Shelf for supporting Beaker with water when taking Specific Gravities ... 22 10 0

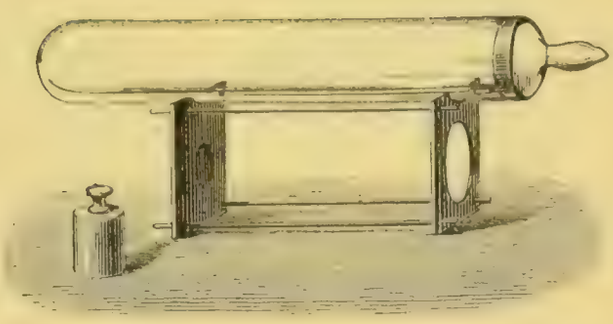
62 ,, No. 25, for a charge up to 1,000 grammes, sensible to $\frac{1}{10}$th milligramme with its full charge. Agate Knives, provided with Arrest for Pans, adjustable Shelf for Specific Gravity, Rider, &c. Beam divided into $\frac{1}{10}$th milligramme, Pans 15 centimetres in diameter 30 16 8

63 ,, Ditto, ditto, in Glass Case, for a charge up to 10 kilogrammes, sensible to 1 milligramme, with its full charge. Pans 24 centimetres in diameter 66 13 4

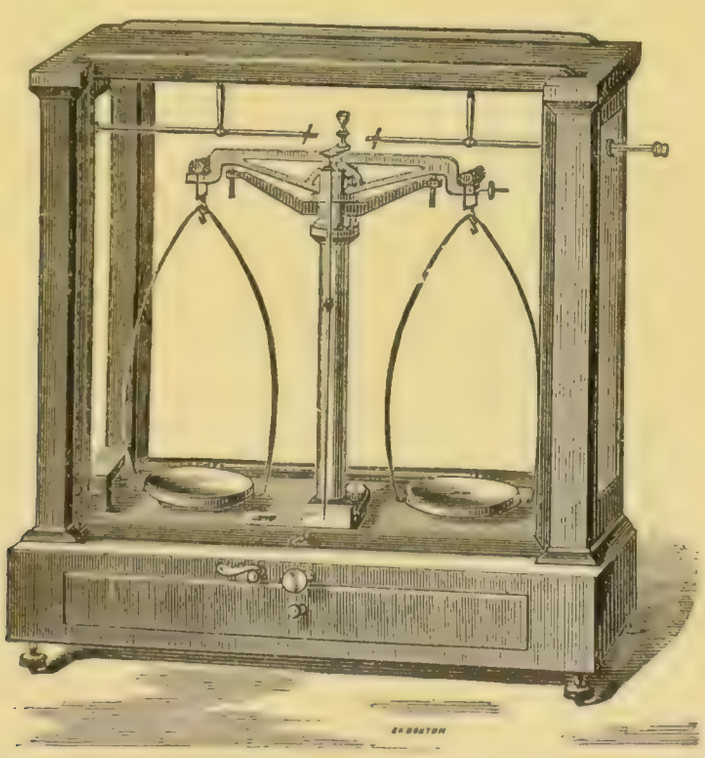
In ordering the above Balances, please say whether Fig. 4 or Fig. 5 is required.



63A



63A **Weighing Stand and Counterpoise,** included in No. 54... £0 4 2



64 Fig. 3A.

64 **Balances,** No. 10A, Short Beam, for a charge up to 100 grammes in each Pan, in French Polished Glass Case, Front Sliding Frame Counterpoised, Beam divided on both sides into $\frac{1}{5}$th part of milligramme, with new improved arrangement for arrest of Pans. Provided with Wood Stand for taking Specific Gravity, Agate Planes, and sensible to $\frac{1}{10}$th part of a milligramme, Pans $7\frac{1}{2}$ centimetres in diameter. Pans and Bows Nickel, provided with two Rider Apparatus £8 15 0

Balances, No. 11A, for a charge up to 100 grammes, with one Rider Apparatus £8 3 4

,, No. 12A, ditto, for 100 grammes, with one Rider Apparatus, but without new improved arrangement for arrest of Pans 7 10 0

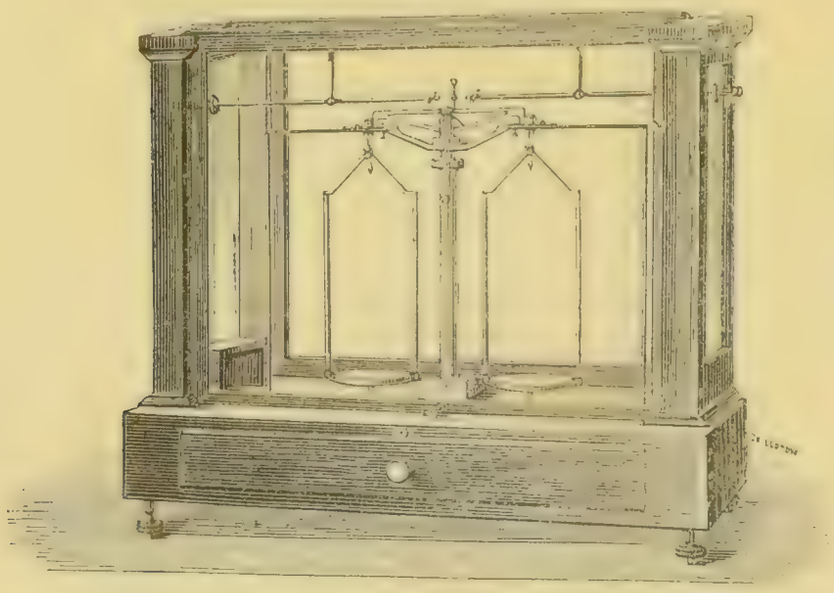
,, No. 13A, ditto, for a charge up to 100 grammes, without Rider Apparatus, and without new improved arrangement for arrest of Pans 6 10 0

,, No. 14A, ditto, the same as No. 10A, for a charge up to 200 grammes in each Pan, sensible to $\frac{1}{5}$th part of a milligramme with its full charge, one Rider Apparatus ... 10 0 0

,, No. 15A, ditto, for a charge up to 500 grammes in each Pan, sensible to 1 milligramme with its full charge ... 12 10 0

,, No. 16A, ditto, for a charge up to 1,000 grammes in each Pan, sensible to 2 milligrammes with its full charge ... 16 13 4

All these Balances can be supplied with Agate Knife Edges at the extra charge of 1 0 0



71. Fig. 3B.

71 **Balances,** No. 82, new improved Short Beam Balance, in French Polished Mahogany Glass Case, Front Sliding Frame, Counterpoised for a charge up to 2,000 grains in each Pan, sensible to $\frac{1}{500}$th grain, or 125 grammes, and sensible to $\frac{1}{10}$th milligramme, with new improved arrangement for arrest of Pans and Beam, running on Agate Planes, Double Rider Apparatus, provided with Apparatus for taking Specific Gravity, Nickel Pans 3 inch diameter £11 10 0

,, The same, with Agate Knife Edges 12 10 0

Balances, No. 83, new improved Short Beam Balance in French Polished Mahogany Glass Case, Front Sliding Frame Counterpoised, for a charge up to 1 lb. in each Pan, sensible to $\frac{1}{200}$th grain, or 350 grammes, and sensible to $\frac{1}{5}$th milligramme, Nickel Pans 3½ inch diameter ... £13 10 0

,, The same, with Agate Knife Edges 14 10 0

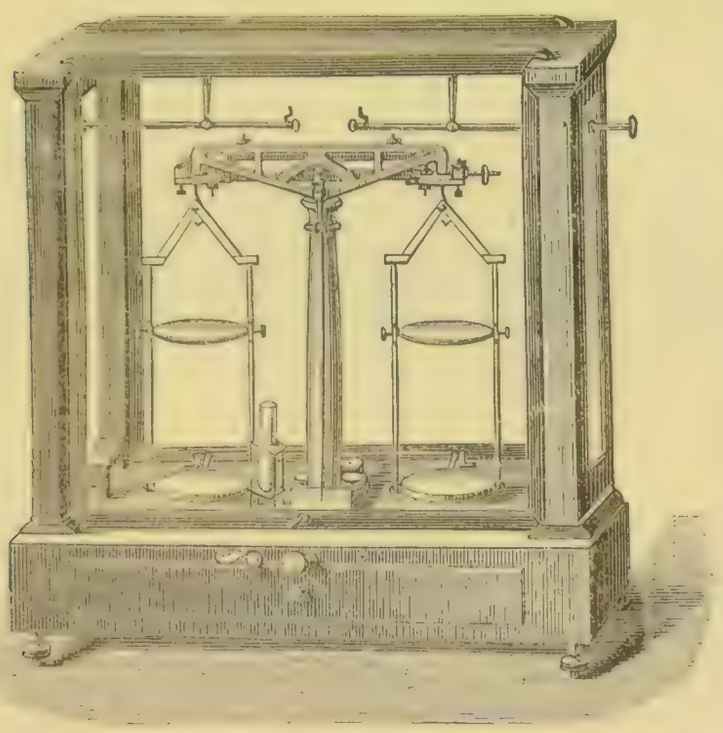
,, No. 84, ditto, for a charge up to 2 lb. in each Pan, sensible to $\frac{1}{500}$th grain, or 750 grammes, and sensible to $\frac{1}{10}$th milligramme, Nickel Pans 4 inch diameter... ... ... 15 10 0

,, The same, with Agate Knife Edges 16 10 0

,, No. 85, ditto, for a charge up to 3 lb. in each Pan, sensible to $\frac{1}{100}$th grain, or 1,200 grammes, and sensible to ½ milligramme, Nickel Pans 6 inch diameter 17 16 8

,, The same, with Agate Knife Edges 18 16 8

All these Balances with one Rider Apparatus 10/ less.



78A. Fig. 4A.

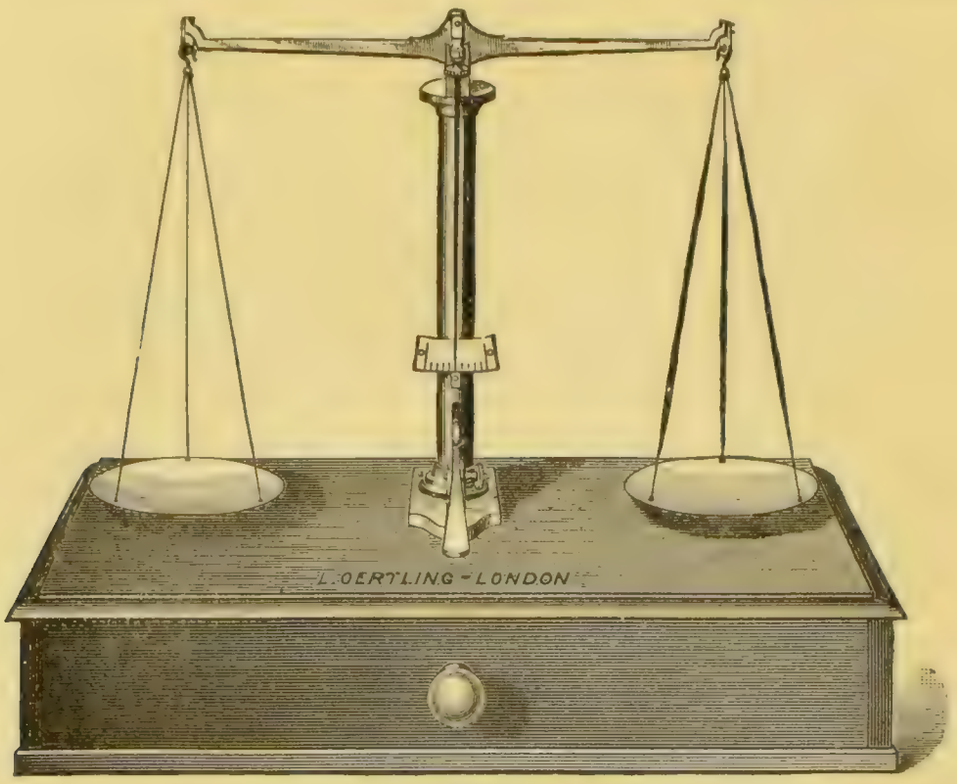
Becker's New Improved Short Beam Balance on Plate Glass Bottom, Beam graduated in $\frac{1}{10}$th milligrammes; Rider can remain on centre of Beam and be used from the 0 point. All latest improvements, in Polished Mahogany Glass Case, Front Sliding Frame Counterpoised, with Glass Top so as to admit more light.

78A **Balances,** No. 19A. For a charge up to 200 grammes in each Pan, sensible to $\frac{1}{10}$th milligramme... ... ... £17 1 8

No. 20A. The same, with Agate Knife Edges 18 1 8

No. 22A. For a charge up to 500 grammes in each Pan, sensible to $\frac{1}{10}$th milligramme 21 16 8

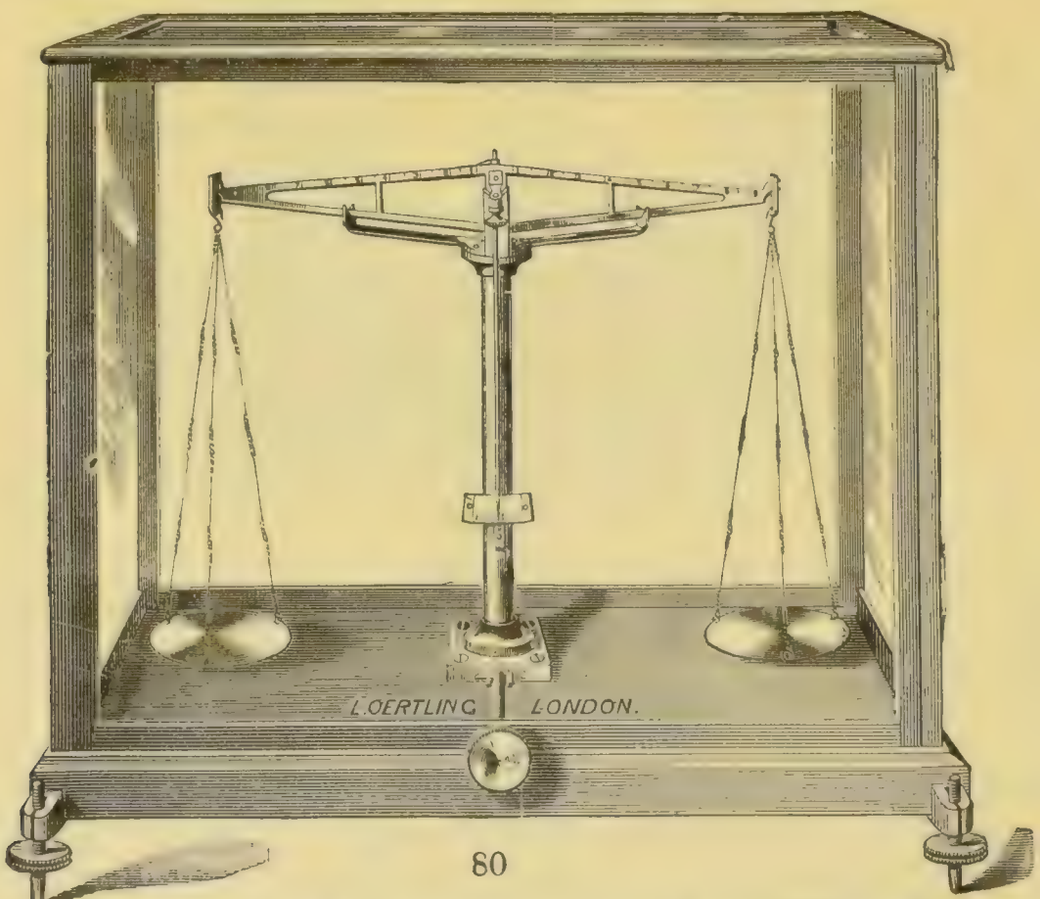
No. 23A. The same, with Agate Knife Edges 23 0 0



79

79 **Balance,** Oertling's, with 8 in. Beam, to carry 500 grains in each Pan, and turn with $\frac{1}{50}$th of a grain. Packed in Mahogany Box with Drawer £3 3 0

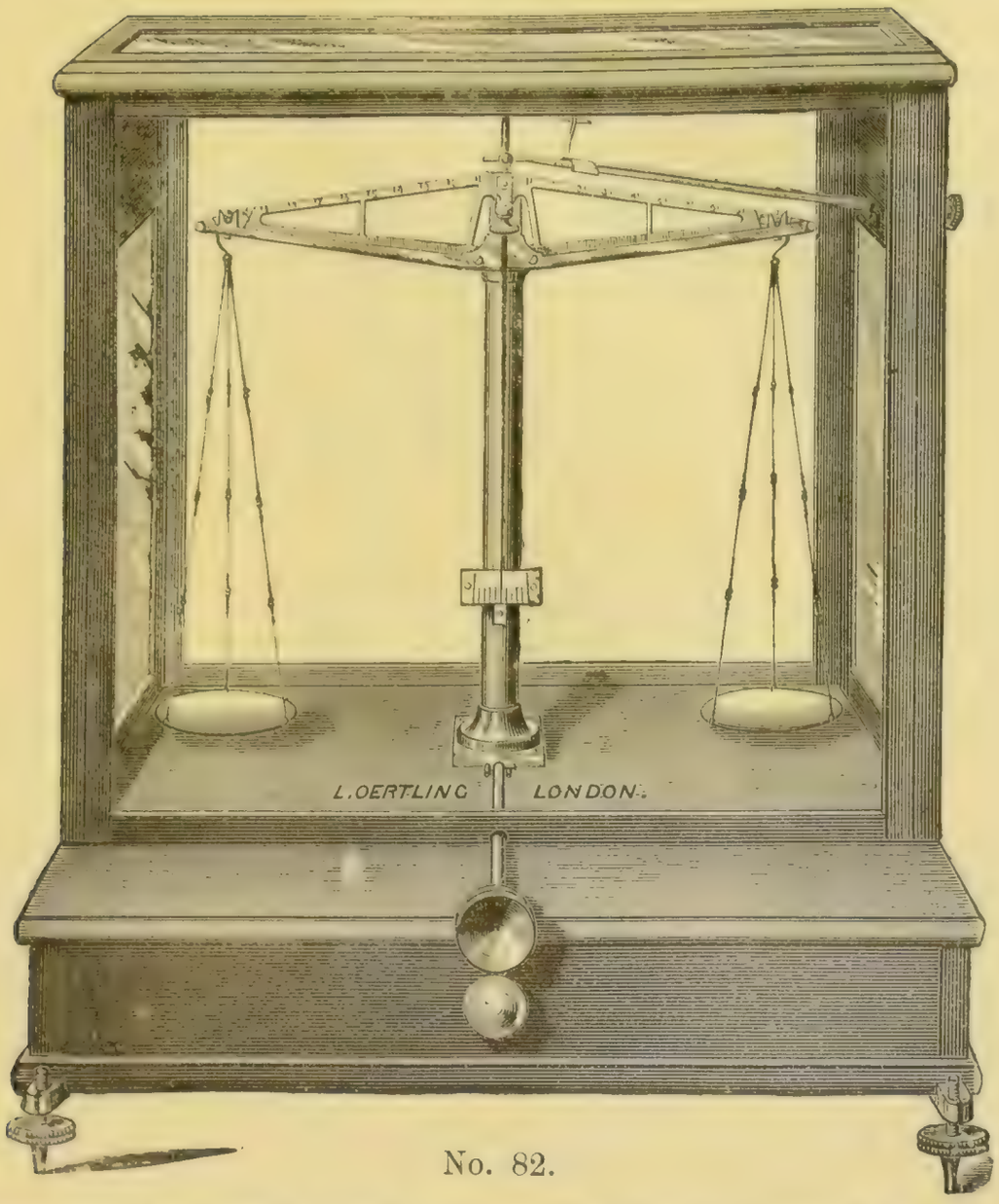
79A ,, The same Balance in Glass Case 4 0 0



80

80 **Balances,** Oertling's, No. 2, in Glass Case, Beam 12 in. with Adjusting Screws, to carry 800 grains, and turn to $\frac{1}{50}$th grain £6 6 0

81 ,, Oertling's, in Glass Case, Beam 12 in. ditto, to carry 1,500 grains, and turn to $\frac{1}{100}$th grain, with Steadying Apparatus 7 10 0



No. 82.

82 **Balances,** Oertling's, No. 3, with 12 in. Beam, to carry 1,500 grains in each Pan, and turn distinctly with $\frac{1}{200}$th of a grain. The Beam is divided. Apparatus fixed in Case for moving the Sliding Weight, Short Pan for taking Specific Gravities, Glass Case with Adjusting Screws. The Beam of this Balance is constructed with Straight Knife Edges at the ends upon which the Pans are suspended by Agate Planes £8 10 0

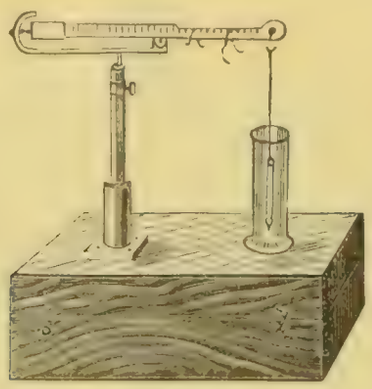
83 „ Oertling's, No. 3A, ditto, ditto, with Beam, fitted with Agate Edges and Planes. No Steel used in construction. Front of Glass Case Sliding, with Counterpoise Weights ... 9 10 0

Same, with Stops for Pans ... ... extra 1 1 0

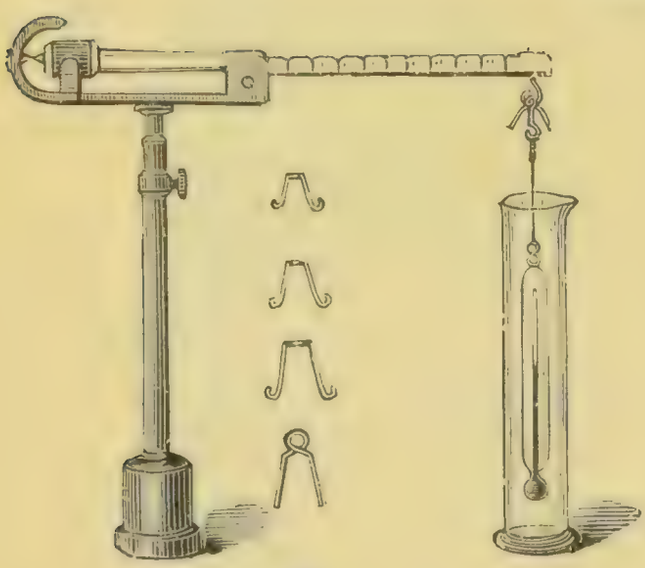
84 „ Oertling's, No. 4, with 14 in. Beam, to carry 1,500 grains in each Pan, and indicated when loaded $\frac{1}{1000}$th of a grain. The Beam is constructed with Knife Edges at the ends, upon which the Pans are suspended by Agate Planes. The centre also works upon a Single Agate Plane. The Beam is divided. Apparatus for moving the Sliding Weight. Pan for taking Specific Gravities. Glass Case with Adjusting Screws... ... ... 15 0 0

85 **Balances,** Oertling's, No. 5, as No. 84, with Apparatus for steadying the Pans connected with the same Axis which moves the Beam, so that one movement of the handle first releases the Pans and then the Beam. The three Edges of the Beam are made of Agate, so that all the working parts of the instrument are most effectually protected against the fumes of the laboratory, or the effects of a damp climate £18 18 0

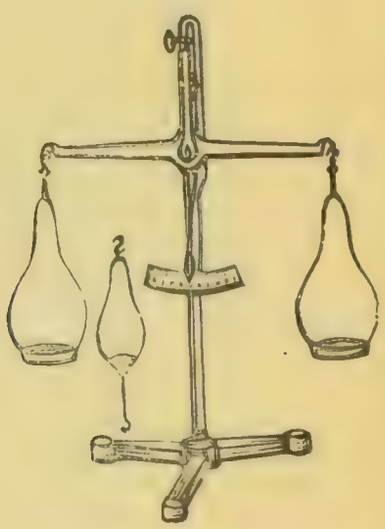
Same, with Plate Glass Bottom to Case 21 0 0



86A



86



86E

86 **Balances,** for taking the Specific Gravity of small quantities of liquids. Balance Riders, Plummet, with Thermometer and Forceps, fitted in Polished Wood Box... ... ... £2 5 0

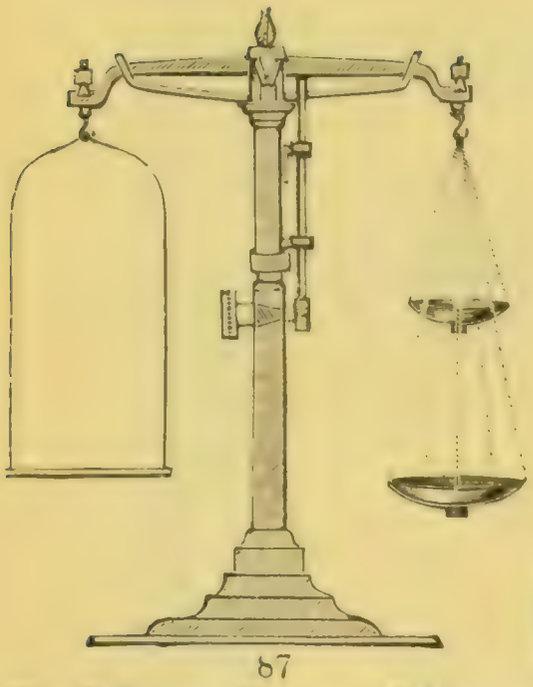
86A ,, Specific Gravity, after Mohr, in Wood Box 1 15 0

86C ,, Jolly's, on Iron Tripod Foot, with Levelling Screws, Divided Glass Scale 2 5 0

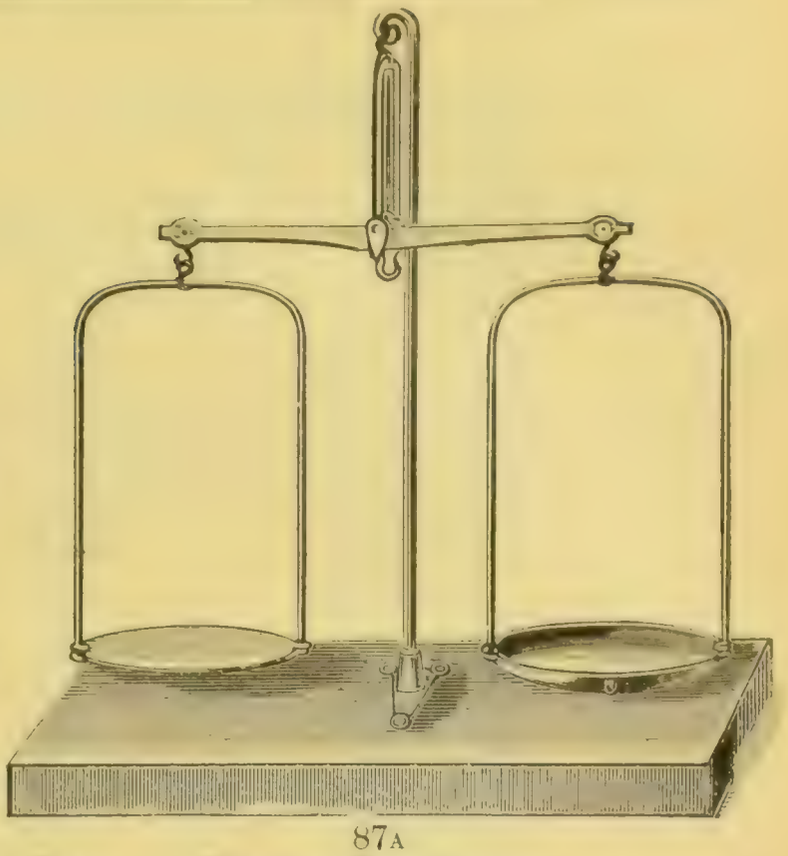
86D ,, Spring, with Tin Pans—

To weigh from $\frac{1}{4}$ oz. to 12	20	25 lbs
2/6	5/	6/6

86E & 2426 **Balances,** Physical, on Iron Tripod, 24 in. high, made to unscrew at the centre for portability, with Index. Brass Beam 24 in., Brass Scale Pans $5\frac{1}{2}$ in. diameter, and small Pan with Hook for Specific Gravity 1 10 0



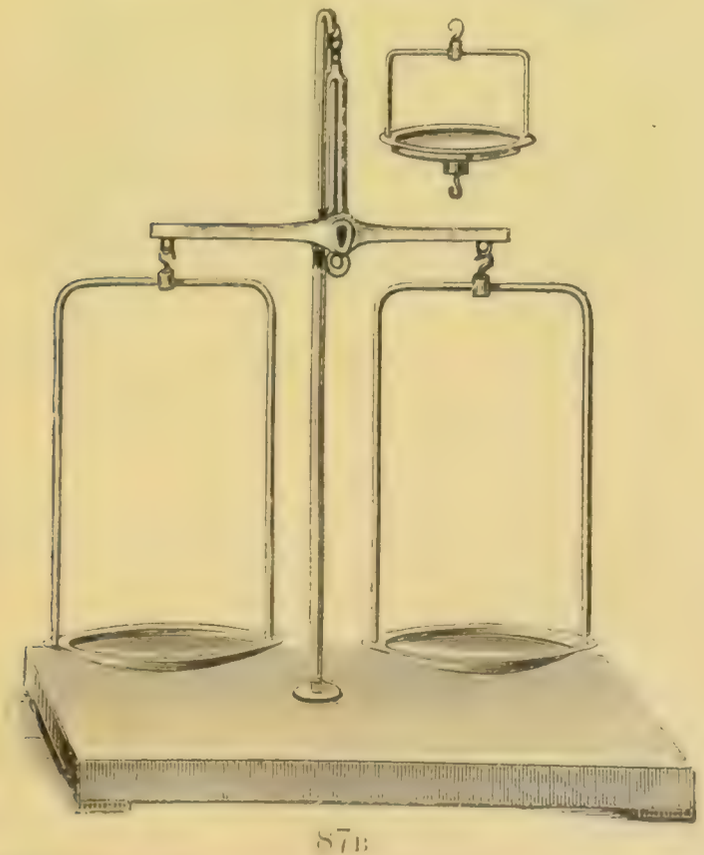
87



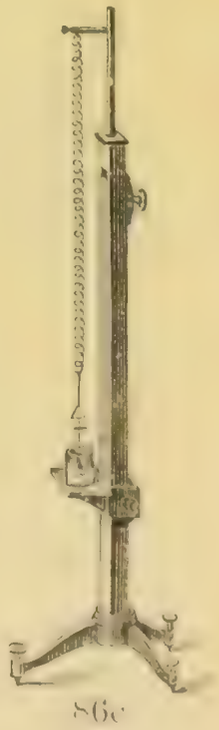
87A

87 **Balance,** Townson & Mercer's, Brass, for Physical Experiments and Lecture, on polished Brass Pillar, to carry 1,000 grammes in each Pan, and sensible to 10 milligrammes, with Pan for Specific Gravity. Height of Pillar 21 in., diameter of Pans 5 in., length of Beam 16 in. £2 10 0

87A **Balance,** for Physical Experiments, Bronzed Iron, to carry 1,000 grammes, length of Beam about 12 in., Brass Pans 6 in. diameter, on Polished Wood Stand 0 10 6

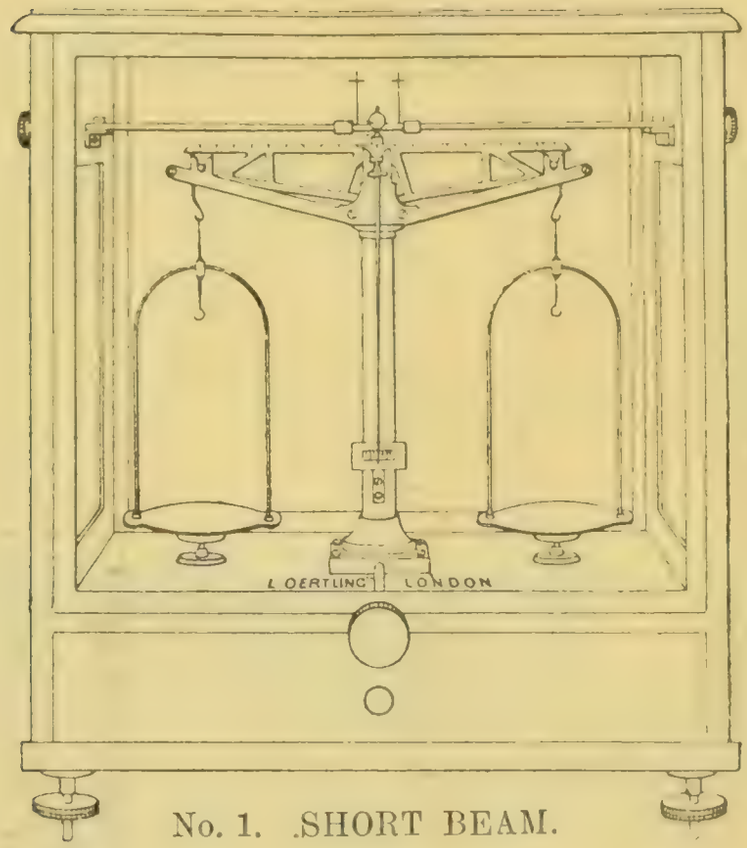


87B



86C

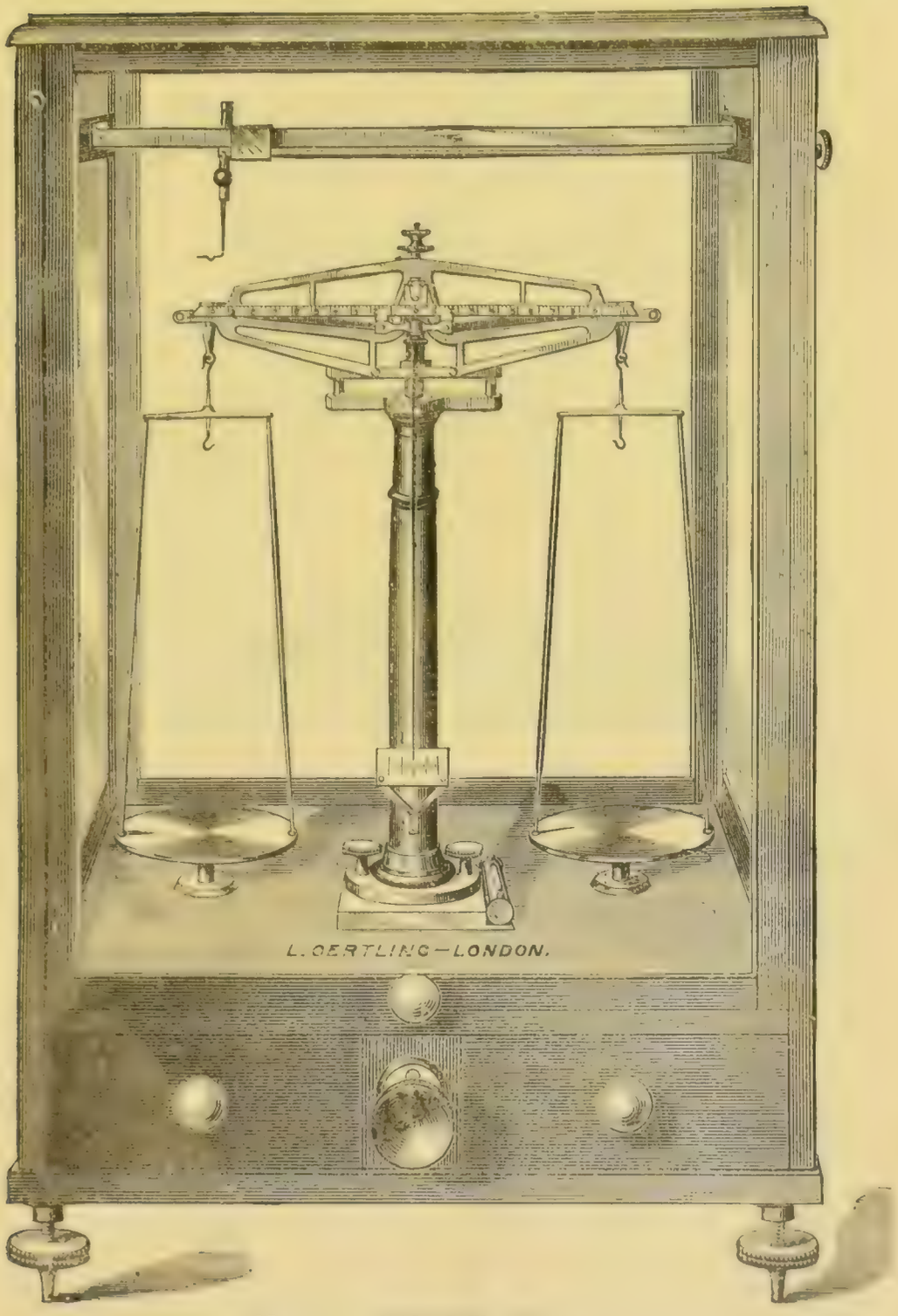
87B **Balance,** Brass, to carry 500 grammes, length of Beam 12 in., Scale Pans 5½ in. diameter, mounted on Polished Wood Stand £1 1 0



No. 1. SHORT BEAM.

88

88	**Balances,**	Oertling's, with 8 in. Beam, Agate Knife Edges, to carry 1,500 grains in each Pan, and turn with $\frac{1}{500}$th grain; fitted with Double Rider Slide, Front of Glass Case with Counterpoise Weights	£12	12	0
89	,,	As above, with Pan Supports	13	13	0
		Ditto with Plate Glass Bottom	15	15	0
90	,,	Oertling's, Short Beam, No. 2, with 6 in. Oval Beam, Agate Knife Edges, Rider Slide, Plate Glass Bottom to Case, Front of Case with Counterpoise Weights, to carry 5,000 grains, and turn with $\frac{1}{500}$th grain	16	10	0
91	,,	Ditto, Balance as above, fitted with Pan Supports	17	17	0
92	,,	Oertling's, Short Beam, No. 3, with $6\frac{1}{2}$ in. Triangular Beam, Agate Knife Edges, to carry 2 lbs. in each Pan, and turn with $\frac{1}{500}$th grain, with Rider Slide, in Glass Case, no Drawers, without Pan Supports	16	16	0
		Ditto, ditto, with Drawers	17	17	0
93	,,	Ditto, ditto, with Pan Supports	18	18	0
94	,,	Ditto, ditto, ditto and Plate Glass Bottom to Case	21	0	0



No. 5. SHORT BEAM.

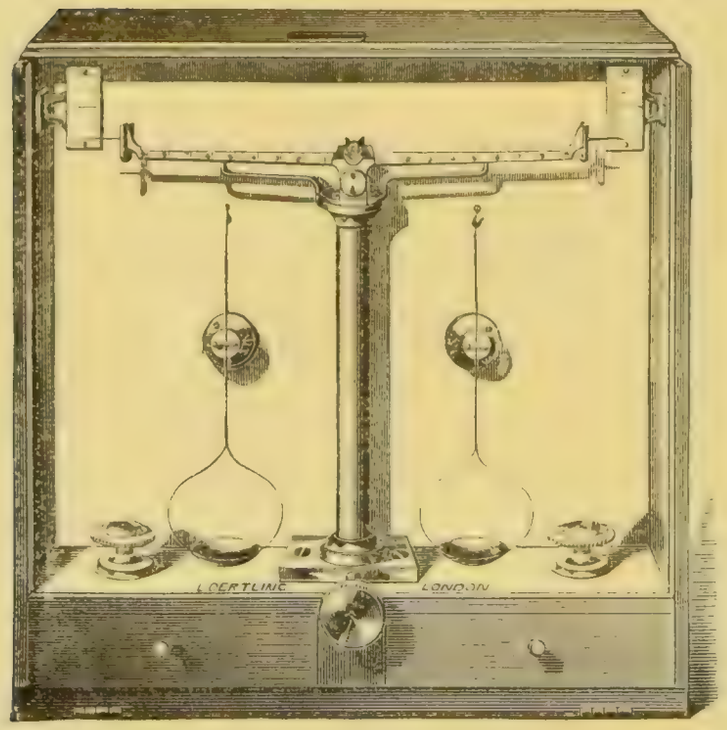
91A

91A **Balance,** with 8 in. Beam, to carry 500 grammes in each Pan, and turn with $\frac{1}{10}$th of a milligramme. The Rider Bar is fitted in the plane of the three Knife Edges, and is divided into 100 parts. Apparatus for moving the Rider is of superior construction; the three Knife Edges are of Agate, and work on Agate Planes; Supports for Pans; Glass Case, with Counterpoise Weights and Adjusting Screws ... £21 0 0

Plate Glass to Bottom of Case ... ... extra 2 2 0

c 2

ASSAY BALANCES.



100

95 **Balances,** Assay, Oertling's, No. 10, in Glass Case, Beam 8 in., to carry 50 grains, and turn to $\frac{1}{200}$th grain £5 15 0

96 ,, Assay, Oertling's, No. 8, ditto, with Adjusting Screws, Beam 10 in., to carry 500 grains, and to turn at $\frac{1}{1000}$th grain ... 12 12 0

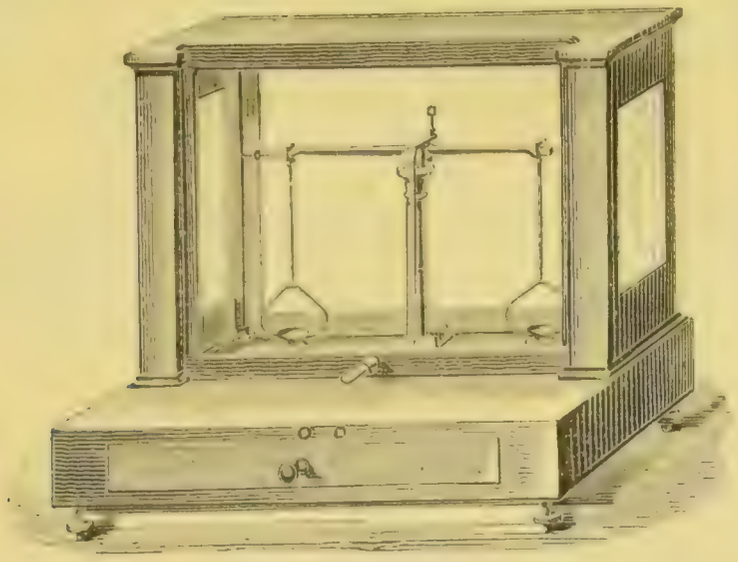
97 ,, Assay, Oertling's, No. 11, with 8 in. Beam, to carry 30 grains in each Pan, and turn to $\frac{1}{1000}$th grain, Beam divided, and Apparatus fixed for moving Sliding Weights 15 0 0

98 ,, Assay, Oertling's, No. 12, with Beam 10 in. long, of an improved construction, on Stand with Double Columns, to carry 30 grains in each Pan, and turn with $\frac{1}{1000}$th grain, the Beam divided, and Apparatus fixed for moving Sliding Weights, Plate Glass for bottom of Case 25 0 0

99 ,, Assay, Oertling's, No. 12A, with Beam 10 in., of an improved construction, to carry 30 grains in each Pan, and turn with $\frac{1}{1000}$th grain, Beam divided, Agate Edges working on Agate Planes, Apparatus for the use of Sliding Weights, Plate Glass for bottom of Case 30 0 0

100 ,, Oertling's, Portable Assay, in Glass Case, to carry 30 grains in each Pan, and turn to $\frac{1}{2000}$th grain, outside dimensions of Case 8 in. square by 2 in. deep 7 10 0

BECKER'S SONS' ASSAY BALANCES.



101

101 **Balances,** No. 1, Assay Balance, in French Polished Glass Case, Sliding Frame Counterpoised. Can be charged up to 25 grammes in each Pan. Deviation of Needle on scale 10 divisions for 1 milligramme. Steel Knives with Agate Bearings £7 10 0

102 ,, No. 2, ditto, ditto, in French Polished Glass Case, with Counterpoised Sliding Frame. When loaded up to 1 gramme in each Pan the Needle deviates 20 divisions on the scale for 1 milligramme, $\frac{1}{100}$th part of a milligramme is therefore registered. Steel Knives with Agate Bearings 9 3 4

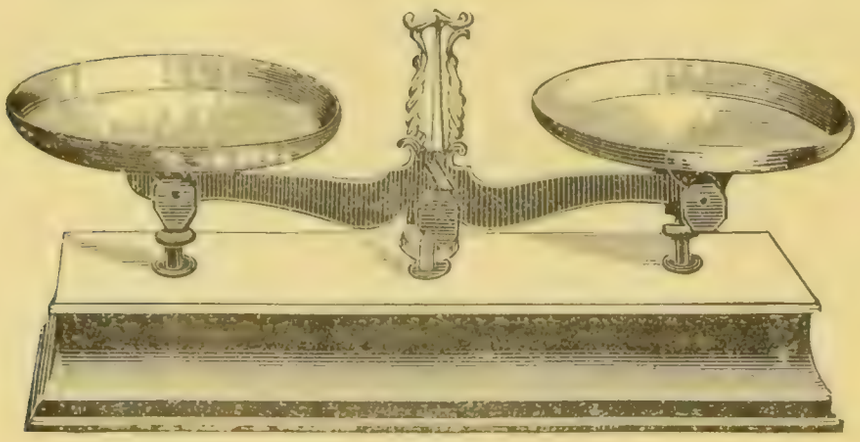
103 ,, No. 3, ditto, ditto, up to 10 grammes in each Pan 10 0

104 ,, No. 4, ditto, ditto, with Apparatus for Rider, Beam divided into $\frac{1}{10}$th part of a milligramme 11 5 0

105 ,, No. 5, ditto, ditto, in French Polished Glass Case, Sliding Frame Counterpoised. Agate Planes, with new improved arrangement for arrest of Pans and Beam. Loaded with 10 grammes the Needle deviates 20 divisions for 1 milligramme 13 1 8

106 ,, No. 5A, in French Polished Glass Case, for a charge up to 10 grammes in each Pan. Agate Planes, with new improved arrangement for arrest of Pans, combined with the Beam. Division on the Needle on scale 30 divisions for 1 milligramme. Beam divided on both sides into $\frac{1}{10}$th part of a milligramme 16 10 0

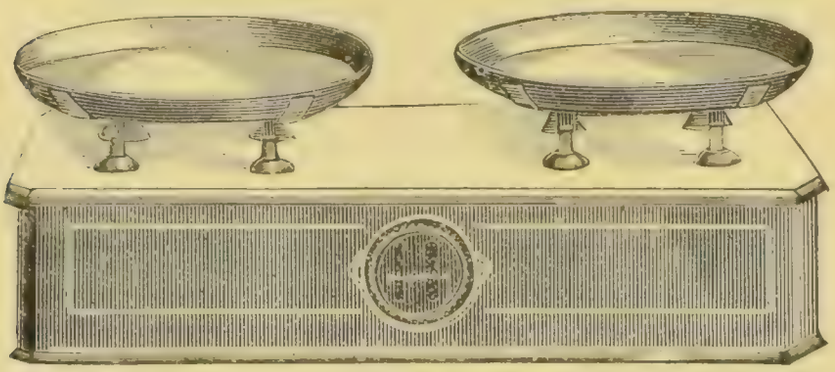
107 ,, No. 5B, ditto, ditto, with Agate Knives 17 10 0



108A

108A **Balance,** French pattern, Single Action, with Black Wood Box, Marble Top, and Brass Pans—

To Weigh ...	1	2	4	7	10	20	lbs.
Diam. of Pans	$4\frac{3}{4}$	$5\frac{1}{2}$	7	8	9	10	ins.
Prices ...	15/	16/6	18/6	21/	24/	28/	



109A

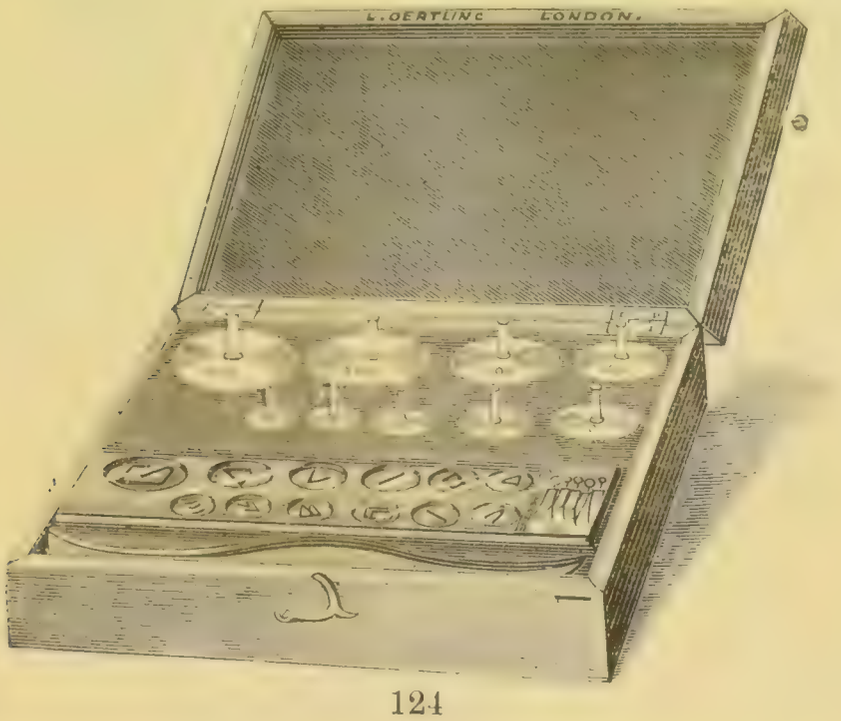
109A **Balance,** French pattern, Double Action, with Polished Walnut Box, Marble Top, and Brass Pans—

To Weigh ...	2	4	10	20	30	lbs.
Diam. of Pans	$5\frac{1}{2}$	7	9	10	11	ins.
Prices ...	21/	25/	31/	40/	47/	

NOTE.—The 2 lb. size is supplied with only two bearings.

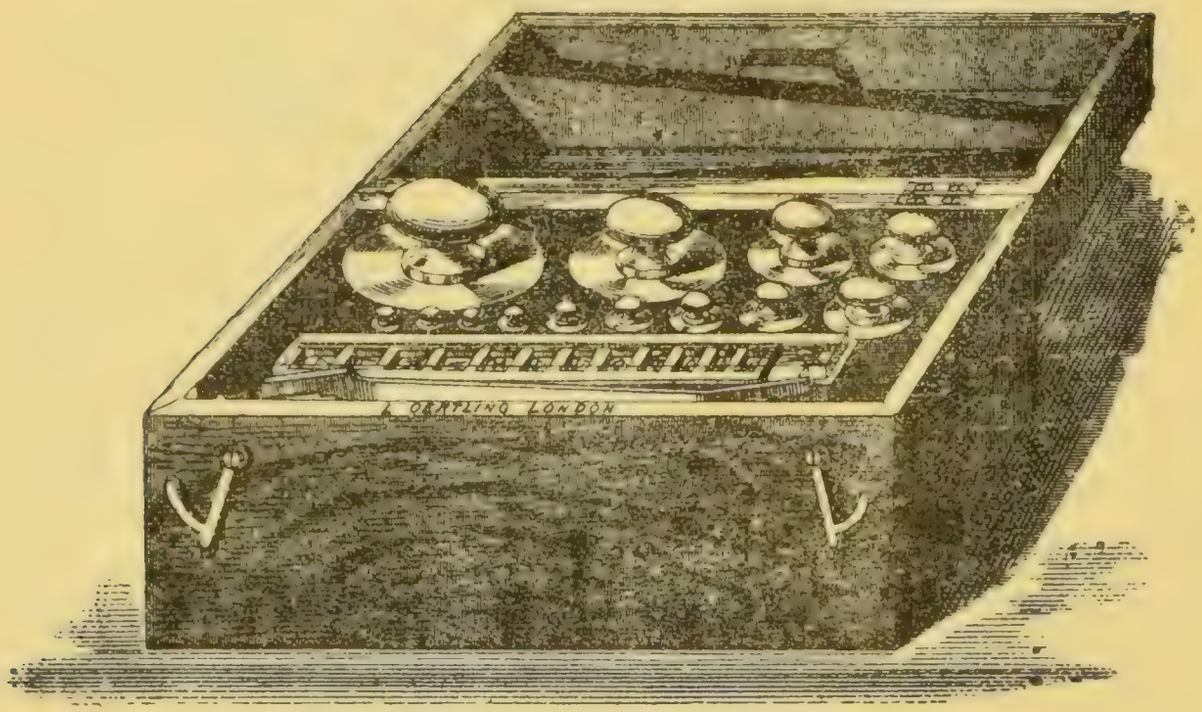
113	**Weights,** Brass, Apothecaries', $\frac{1}{2}$ grain to 6 grains					10	0 4
114	,, ,, ,, $\frac{1}{2}$ scruple to 2 drams					0	0 8
115	,, ,, Avoirdupois, 4 oz. to $\frac{1}{4}$ oz.					0	1 6
116	,, ,, ,, 1 lb. to $\frac{1}{4}$ oz.					0	3 6
117	,, Iron ,, 1 lb. to $\frac{1}{2}$ oz.					0	1 3
117A	,, ,, Square, with Ring Handle—						
	2	4	7	14	28 lbs.		
	9d.	1/3	1/10	3/6	4/6 each		
118	,, ,, 1 kilog. to 50 grammes, set					0	5 0
119	,, Brass, Troy, Cup form, 2 oz. to $\frac{1}{4}$ oz., set					0	2 3
	4 oz. to oz., set					0	3 6
120	,, ,, ,, ,, 12 oz. to $\frac{1}{4}$ oz., set					0	7 6

121	**Weights,** Brass, 200 grains to ½ grain, set	£0	1	6
122	,, ,, 5 grammes to 1 centigramme, set	0	2	0
122A	,, ,, Gramme, cheap form, fitted in Oak Blocks, from 1 gramme upwards.			
	50 grammes together	0	1	0
	100 ,, ,, ...	0	1	6
	500 ,, ,, ...	0	3	6
	1,000 ,, ,, ...	0	5	0
122B	**Weights,** Cheap form, in Oak Block, 10 grammes to 1 centigramme	0	1	0
123	**Scale Pans,** Glass, 2½ in. and 3 in. diameter, with three holes drilled in each for cords ... ... per pair	0	1	6



124

124	**Weights,** Chemical, Oertling's, in Polished Mahogany Box, with Forceps and Riders, 1,000 grains to $\frac{1}{100}$th	£1	15	0
125	,, Ditto ditto 600 ,, ,,	1	10	0
126	,, Ditto ditto 10,000 grains to 1,000 grains	2	5	0
127	,, Ditto ditto 50 grammes to 1 milligramme	1	15	0
128	,, Ditto ditto 100 ,, 1 ,,	2	5	0
128C	,, Ditto Oertling's, in Mahogany Box, 50 grammes to 1 centigramme	0	15	0
128D	,, Ditto ,, 1,000 grains to $\frac{1}{100}$th grain ...	0	15	0
128A	,, Ditto, Sartorius, in Polished Mahogany Box, Weight Strongly Gilt, 50 grammes to 1 milligramme	1	10	0
121B	,, Ditto, ditto, Polished and Lacquered	1	5	0



129

129 **Weights,** Oertling's, Set containing the following Weights:—
10,000, 6,000, 3,000, 2,000, 1,000, 600, 300, 200, 100, 60, 30, 20, 10, 6, 3, 2, 1, ·6, ·3, ·2, ·1, ·06, ·03, ·02, ·01 ... £3 12 0

130 ,, Set of 6,000 grains to $\frac{1}{100}$th grain 3 3 0

131 ,, ,, 1 kilogramme to 1 milligramme 3 15 0

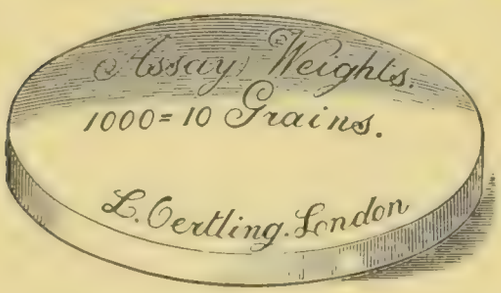
132 ,, ,, 500 grammes to 1 milligramme 3 3 0

133 ,, ,, 1 kilogramme to 100 grammes 2 10 0

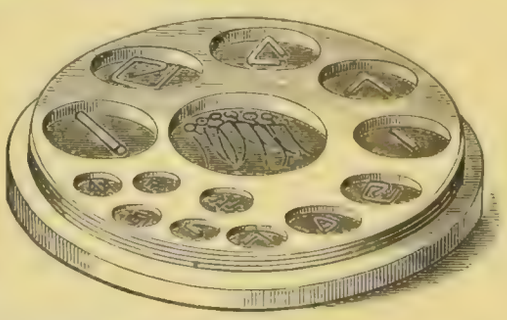
134 ,, Oertling's, Sets grains, Platinum, 3/6; tenths, 3/; hundredths, 3/

135 ,, ,, decigrammes, 6/6; centigrammes, 4/6; milligrammes, 3/

136 ,, ,, Riders, tenths or centigrammes, each 6d.



137



137 **Weights,** Set of 10 grains and its sub-divisions in 1,000 parts in Platinum, for assaying Silver £1 10 0

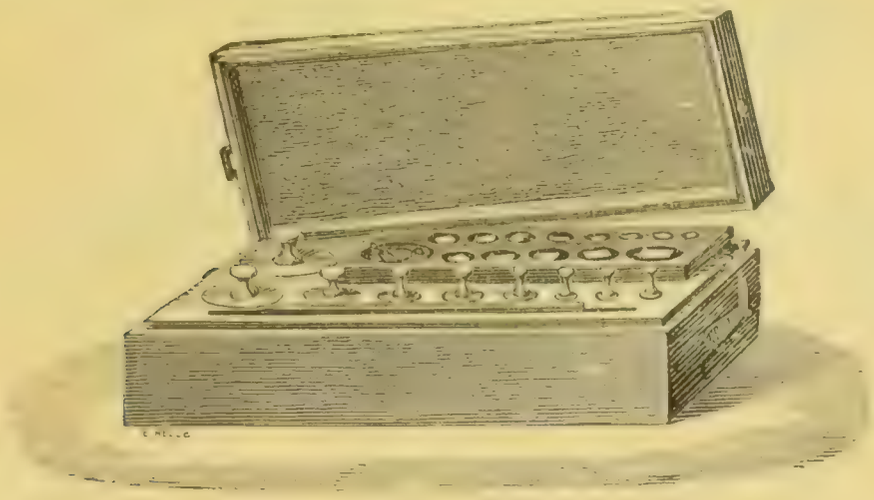
138 ,, Set of 1 gramme and its sub-divisions in 1,000 parts in Platinum, for assaying Silver 1 10 0

139 ,, Set of $\frac{1}{2}$ gramme and its sub-divisions in 1,000 parts in Platinum, for assaying Gold 1 10 0

WEIGHTS No. 1.

ADJUSTED TO THE UTMOST ACCURACY.

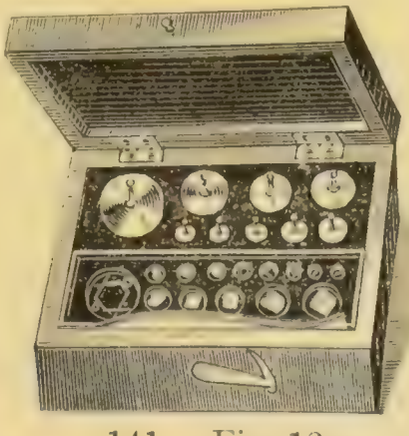
MANUFACTURED BY BECKER'S SONS, ROTTERDAM.



158. Fig. 12.

In French Polished Mahogany Boxes, lined with Velvet, with Nickel Plated Forceps, every piece fitted separately; Brass Weights lacquered; the fractions of the gramme are Platinum except below 20 milligrammes, which are made of Aluminium.

1	Platinum gramme to $\frac{1}{10}$th milligramme	£1	5	10
2	Ten grammes to $\frac{1}{10}$th milligramme	1	10	0
4	Fifty grammes to 1 milligramme, 3 riders	2	1	8
5	Hundred grammes to 1 milligramme, 3 riders	2	6	8
6	Two hundred grammes to 1 milligramme, 3 riders	2	18	4

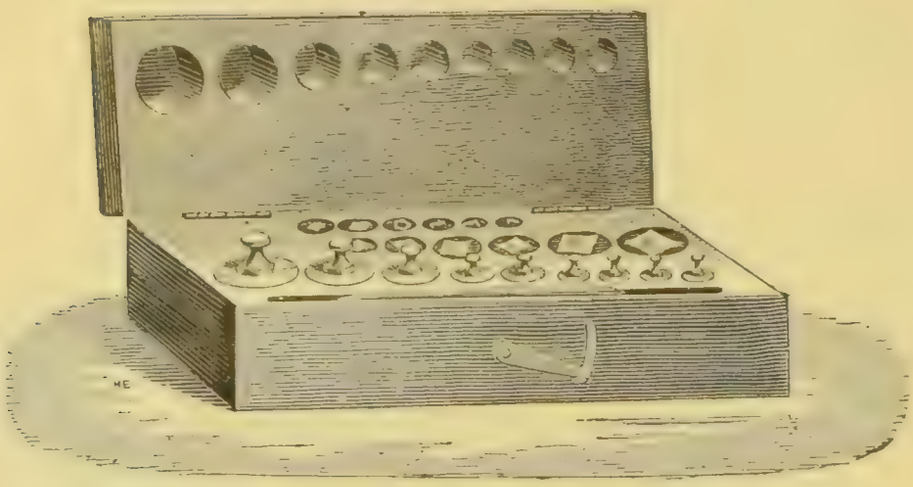


141. Fig. 12A.

In French Polished Mahogany Boxes, with Plate Glass cover for the Platinum and Aluminium Weights, and Nickel Plated Forceps.

4A	Fifty grammes to 1 milligramme, 2 riders...	£1	10	0
5A	Hundred grammes to 1 milligramme, 2 riders	1	18	4
47	One thousand grains to $\frac{1}{100}$th grain, 2 riders	1	10	0

WEIGHTS No. 2.



142. Fig. 13.

In Mahogany Boxes, lined with Velvet, Nickel Plated Forceps, and Two Riders.

10	10 grammes to a milligramme	£1	1	8
11	20 grammes to a milligramme	1	4	2
12	50 grammes to a milligramme	1	6	8
13	100 grammes to a milligramme	1	9	2
46	1,000 grains to $\frac{1}{100}$th grain	1	6	8
	Set of Assay Ton Weights of 4 A. T. down to $\frac{1}{20}$th A. T. ...	0	15	0

The Assay Ton Weights have been introduced by Prof. Dr. C. F. Chandler, of the School of Mines, Columbia College, New York, where they are now in use for convenience in the assay of ores. The weight denominated by Dr. Chandler one "A. T." equals 29·1666 grammes, and contains consequently as many milligrammes as there are Troy ounces in a ton Avoirdupois of 2·000 pounds. Therefore, if one A. T. of ore assays 1 milligramme, the ton contains 1 ounce Troy.

WEIGHTS No. 4.

In French Polished Mahogany Boxes, lined with Green Cloth, Brass Forceps, every piece fitted separately; the fractions of the gramme are made of Aluminium.

144. Fig. 13.

25	500 milligrammes to 1 milligramme	£0	7	1
26	1,000 milligrammes to 1 milligramme	0	7	11
28	50 grammes to 1 milligramme	0	11	8
29	100 grammes to 1 milligramme	0	12	6
30	200 grammes to 1 milligramme	0	14	2
31	500 grammes to 1 milligramme	0	18	4
32	1 kilogramme to 1 milligramme	1	4	2
32A	Two 1 kilogrammes to 1 milligramme, together 3 kilogrammes ...	1	15	0
32B	One 2 kilogramme, two 1 kilogrammes to 1 milligramme, together 5 kilogrammes	2	14	2

32c	One 5 kilogramme, one 2 kilogramme, two 1 kilogrammes to 1 milligramme, together 10 kilogrammes	£4	11	8
52	500 grains to $\frac{1}{100}$th grain	0	10	10
53	1,000 grains to $\frac{1}{100}$th grain	0	11	8
54	2,000 grains to $\frac{1}{100}$th grain	0	12	6
55	5,000 grains to $\frac{1}{100}$th grain	0	14	2
56	10,000 grains to $\frac{1}{100}$th grain	0	18	4

WEIGHTS No. 5.

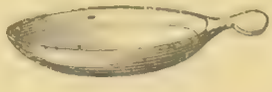


161. Fig. 14.

37	50 grammes to 1 gramme	£0	4	2
37A	50 grammes to 1 centigramme	0	7	6
38	100 grammes to 1 gramme	0	5	0
38A	100 grammes to 1 centigramme	0	8	4
39	200 grammes to 1 gramme	0	6	8
39A	200 grammes to 1 centigramme	0	10	0
40	500 grammes to 1 gramme	0	8	9
41	1 kilogramme to 1 gramme	0	12	6
41A	Two 1 kilogrammes to 1 gramme, together 3 kilogrammes ...	1	0	0
41B	One 2 kilogramme, two 1 kilogrammes to 1 gramme, together 5 kilogrammes	1	16	8
58A	1,000 grains to $\frac{1}{10}$th grain	0	7	6
59A	2,000 grains to $\frac{1}{10}$th grain	0	8	4
60A	5,000 grains to $\frac{1}{10}$th grain	0	10	0
61A	10,000 grains to $\frac{1}{10}$th grain	0	12	1
62A	20,000 grains to $\frac{1}{10}$th grain	0	15	10



173 and 175



180

173	**Set of Weights,** Aluminium, 5 2 2 1 decigrammes	£0	1	8
174	,, ,, ,, centigrammes	0	1	8
175	,, ,, ,, milligrammes	0	1	4
176	,, ,, ,, grains	0	1	8
177	,, ,, ,, tenths	0	1	8
178	,, ,, ,, hundredths	0	1	4
179	**Watch Glasses,** accurately adjusted ... ... per pair	0	1	8
180	**Horn Dishes,** adjusted accurately to fit Balances—			

Diameter	5	6	8	9½	11½	15	17	20 centimetres
	1/8	1/8	2/6	3/4	4/2	5/10	6/8	7/6 per pair



180A

180A **Levels,** Spirit, Brass Plate on Polished Wood—

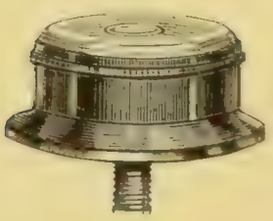
6	8	10	12 in. length about
1	1/3	1/6	2/ each



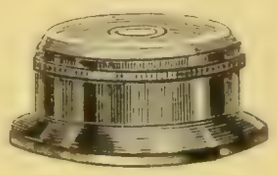
180B

180B **Levels,** Spirit, Brass—

4	...	6 in. length
2/	...	3 each



180C



180D

180C **Levels,** Spirit, Circular, with Screw—

$1\frac{1}{8}$	...	$1\frac{1}{4}$ in. diam.
4/	...	4/6 each

180D ,, ,, ,, Flat, with holes for fixing—

$\frac{5}{8}$	1	$1\frac{1}{2}$	2 in. diam.
2/6	3/3	5/6	7/ each



181

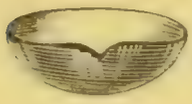
181 **Balloons,** Gold Beaters' Skin, for Hydrogen and Coal Gas—

18	27	32	36	42	48	58	72 in. circumference
1/	1/6	2/	2/6	3/6	4/6	7/	12/6 each

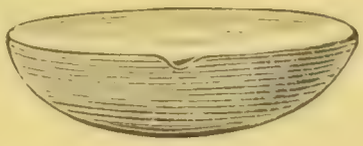
182 ,, Gold Beaters' Skin, in the shape of Punch, 6 ft. high by 9 ft. circumference £3 3 0

185 ,, Collodion, various colours 9d., 1/, 1/6 0 2 0

PORCELAIN EVAPORATING BASINS.



186



187

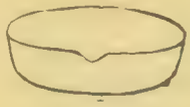
Basins, for Evaporating, with Spout, finest Berlin Porcelain, for Analytical Purposes, with Royal Mark, glazed inside and out, as Fig. 186 to No. 5. Nos. 6 to 12 glazed inside and partially outside; form as Fig. 187.

186	Nos.	...	00	0	1	2	3	4	5	
	Diameter	...	2¾	3¼	3½	3¾	4	4¼	4¾	inches
	Capacity	...	2	2½	3	4	6	8	10	ozs.
			4d.	6d.	8d.	10d.	1/	1/2	1/6	each
			3/9	5/6	7/	8/6	10/	12/	16/	doz.
187	Nos.	...	6	7	8	9	10	11	12	
	Diameter	...	6	7¼	8½	10	12	14	15½	inches
	Capacity	...	15	25	45	80	140	220	380	ozs.
			1/9	2/3	2/9	4/6	7/	9/	24/	each
			20/	24/	32/	52/	80/	96/	260/	doz.

Quantities less than 1 doz. charged at single prices.



188



189

188 **Basins,** Berlin Porcelain, deep form, with Spouts.

Nos.	...	1	2	3	4	5	
Diameter	...	5½	6½	7½	8½	9½	inches
Capacity	...	18	30	45	70	90	ozs.
		2/3	3/	4/	5/	5/6	each

189 **Basins,** Berlin Porcelain, shallow form, with Spout.

Nos.	...	1	2	3	4	5	6	7	
Diameter	...	2¾	3	3½	4	4½	5	6	inches
Capacity	...	1½	2½	3½	5	8	12	18	ozs.
		5d.	8d.	9d.	1/	1/2	1/8	2/	each
		5/	7/	8/	10/	12/	16/	20/	doz.

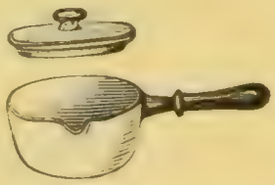
189A **Basins,** Porcelain, shallow, 2¾ in., glazed inside and outside for Milk Analysis, as recommended by Prof. Stokes, 6d. each.



190



191



192

190 **Basins,** Evaporating. Meissen (Dresden) Porcelain, Shallow, Thin, with Spout.

Diameter	$2\frac{3}{8}$	$3\frac{1}{4}$	$4\frac{1}{4}$	5	$5\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{1}{2}$	$8\frac{1}{2}$	10	11	12 ins.
Capacity	$1\frac{3}{4}$	$2\frac{1}{2}$	6	8	12	20	30	45	60	100	140 ozs.
	4d.	5d.	8d.	10d.	1/3	1/9	2/4	3/	3/9	4/6	6/ each

191 **Basins,** Berlin Porcelain, with Porcelain Handle, and Spout (Capsules or Ladles).

Diameter ...	$4\frac{1}{4}$	$5\frac{1}{4}$	7 inches
Capacity ...	11	24	40 ozs.
	2/3	3/6	4/6 each

192 **Basins,** Berlin Porcelain, with Polished Wooden Handle and Cover.

Diameter ...	$3\frac{1}{4}$	$3\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{3}{4}$	$5\frac{1}{2}$	$6\frac{1}{2}$ inches
Capacity ...	6	8	12	20	24	42 ozs.
	1/6	1/9	2/6	3/3	4/	5/ each



193

193 **Basins,** Evaporating. German Porcelain. Glazed inside only.

Diameter	$6\frac{7}{8}$	$7\frac{5}{8}$	$8\frac{1}{2}$	$9\frac{1}{4}$	$10\frac{1}{4}$	$11\frac{1}{4}$	$11\frac{3}{4}$	$12\frac{1}{2}$	$13\frac{1}{2}$	15	16	$17\frac{3}{4}$	$18\frac{5}{8}$ inches
Capacity	16	24	34	40	52	85	100	130	180	220	280	320	360 ozs. about
	6d.	8d.	10d.	1/3	1/6	2/3	2/6	3/6	4/6	5/6	7/	9/	14/ each

194 **Basins,** Porcelain, Berlin form, with Spout, and as Figs. 186 and 187. Very similar to those made at the Royal Works, from $2\frac{3}{4}$ in. to $4\frac{3}{4}$ in. Glazed inside and outside; 6 in. and upwards inside and partially outside.

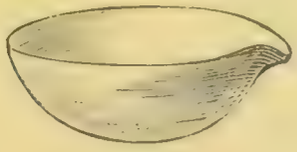
Nos. ...	00	0	1	2	3	4	5	6	7	8	8A	9	10	11	12
Diameter	$2\frac{3}{4}$	$3\frac{1}{8}$	$3\frac{1}{4}$	$3\frac{5}{8}$	4	$4\frac{3}{8}$	$4\frac{3}{4}$	$5\frac{3}{4}$	7	$8\frac{1}{2}$	$9\frac{1}{4}$	$10\frac{3}{8}$	12	14	$15\frac{1}{2}$ inches
Capacity	$1\frac{1}{2}$	2	3	$3\frac{1}{2}$	$5\frac{1}{2}$	9	12	16	26	50	90	120	140	220	380 ozs. abt.
	3d.	4d.	$4\frac{1}{2}$d.	5d.	7d.	9d.	1/	1/4	1/9	2/9	3/	4/	5/6	9/	15/ each
	2/6	3/6	4/	4/6	6/	8/	11/	15/	18/	30/	33/	45/	60/	100/	160/ doz.

195 **Basins,** German Porcelain, Thin, Deep form, with Spout, similar to Fig. 188, Glazed inside only.

Nos. ...	0	1	2	3	4	5	6	7	8	9	
Diameter	2	2½	2¾	3⅜	4	4¼	5	5½	6	6⅝	ins. about
Capacity	1	1½	2½	4	5¾	8	10½	14	18	24	ozs. ,,
	2d.	2d.	2½d.	3d.	4d.	5d.	6d.	7d.	10d.	1/	each
	1/6	1/9	2/	2/6	3/6	4/6	5/6	6/6	9/6	11/6	doz.

196 **Basins,** German Porcelain (Capsules or Dippers), with Porcelain Handle and Spout, as Fig. 191. Similar to Royal Berlin Ware.

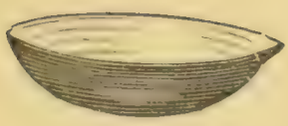
Diameter ...	3⅛	4	4⅛	4½	5¼	6¼ inches
Capacity ...	5	8	10	15	25	40 ozs.
	8d.	10d.	1/	1/3	2/	2/9 each
	7/6	9/6	11/	14/	22/	30/ doz.



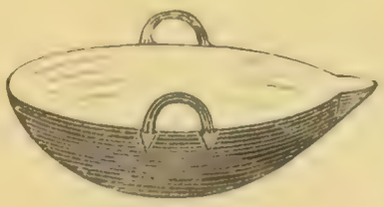
197

197 **Basins,** Thuringian Porcelain, Thin, with good Spouts for Pouring, Glazed inside, biscuit outside.

Diameter	2¼	2⅝	3⅛	3⅝	3⅞	4½	5⅛	5¾	6⅜	inches
Capacity	1	1½	2	3½	5	8	10	14	20	ozs. about
	2d.	3d.	4d.	5d.	6d.	8d.	9d.	10d.	1/	each



198



199



200

198 **Basins,** Enamelled Iron Evaporating, with Lip.

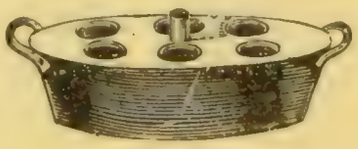
Diameter	4	5	6	7	8	9	10	12 inches
	8d.	9d.	10d.	1/	1/2	1/5	1/9	2/9 each

199 **Basins,** Enamelled Iron Evaporating, with Lip, and Wire Handles cast on.

Diameter	8	9	10	12	13	14	15	16 inches
	1/9	2/	2/6	3/3	4/	4/6	5/6	7/ each

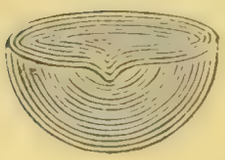
200 **Basins,** Enamelled Iron Evaporating, Sheet Iron, Thin, Deep, with Lip.

Diameter	3¼	4	4¼	5	5½	6 inches
	8d.	9d.	10d.	1/2	1/6	1/9 each

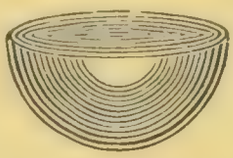


201

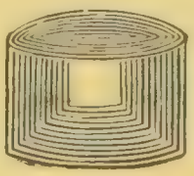
201 Enamelled Iron Digester, with Wire Handles cast on, and Tin Top with 5 holes for Evaporating Basins, Test Tubes, Thermometer, &c., 8 in. diameter £0 5 0



202



203



204

202 **Basins,** Glass, Bohemian, Deep, with Spout and Ground Edges.

Diameter	$1\frac{5}{8}$	2	$2\frac{3}{4}$	$3\frac{1}{8}$	$3\frac{3}{4}$	$4\frac{1}{2}$	$4\frac{3}{4}$	$5\frac{1}{8}$	$6\frac{1}{4}$	$7\frac{1}{2}$	$8\frac{1}{4}$	$9\frac{1}{2}$	$10\frac{1}{4}$ inches
Capacity	1	2	3	5	8	11	16	18	25	30	40	70	80 ozs. about
	3d.	3d.	4d.	5d.	6d.	7d.	8d.	9d.	10d.	1/2	1/6	2/	2/6 each
	2/6	2/9	3/6	4/6	5/	6/	7/	8/	9/	13/	16/	22/	28/ doz.

203 **Basins,** Bohemian Glass, without Spout, Ground Edges, Water Analysis.

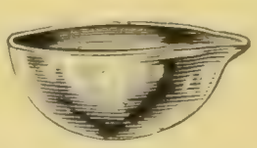
Diameter ...	$3\frac{1}{2}$	4	$4\frac{1}{2}$ inches
Capacity ...	6	8	11 ozs.
	5d.	$5\frac{1}{2}$d.	6d. each

204 **Basins,** Bohemian Glass, with Flat Bottom and Ground Edges (Crystallizing Dishes).

Diameter	2	$2\frac{5}{8}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	$5\frac{1}{8}$	$5\frac{3}{4}$	$6\frac{1}{4}$	$7\frac{1}{2}$	$8\frac{3}{4}$	$9\frac{1}{2}$ inches
Capacity	$2\frac{1}{2}$	$4\frac{1}{2}$	8	10	14	20	25	35	65	120	160	200 ozs. about
	3d.	3d.	4d.	$4\frac{1}{2}$d.	5d.	6d.	7d.	8d.	10d.	1/6	1/10	2/ each
	2/6	2/9	3/6	4/	4/6	5/6	6/6	7/6	9/6	16/	20/	22/ doz.



205



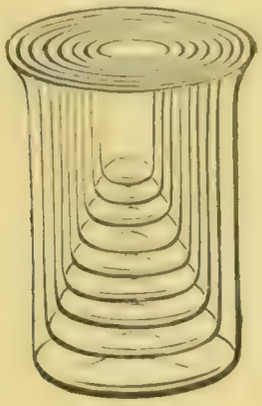
206

205 **Basins,** Platinum, 50/ per oz., 1 oz. capacity being about $\frac{1}{2}$ oz. weight.

206 ,, Evaporating, Nickel Metal, polished—

$1\frac{5}{8}$	2	$2\frac{3}{8}$	$2\frac{3}{4}$	$3\frac{3}{16}$	$3\frac{1}{2}$	4	$4\frac{3}{4}$	6 inches
1	1/3	1/6	2/	2/3	2/9	3/3	4/	5/6 each

206A ,, Nickel Metal, with flat bottom, $2\frac{3}{4}$ in. diam. by 1 in. deep, each 2/6



207

207 **BEAKERS, FINEST BOHEMIAN GLASS, for Hot Solutions, and Uniform Thickness.**

No.	Capacity	Depth	Internal Diam. at Top	Each	Per doz.
000	$\frac{3}{4}$ oz.	$1\frac{3}{4}$ in.	$\frac{7}{8}$ in.	2d.	1/8
00	$1\frac{1}{4}$,,	$2\frac{1}{8}$,,	$1\frac{1}{8}$,,	2d.	1/8
0	$1\frac{3}{4}$,,	$2\frac{1}{2}$,,	$1\frac{3}{8}$,,	3d.	2/9
1	3 ,,	3 ,,	$1\frac{5}{8}$,,	4d.	3/4
2	$4\frac{1}{2}$,,	$3\frac{1}{2}$,,	$1\frac{7}{8}$,,	5d.	4/6
3	7 ,,	4 ,,	$2\frac{1}{8}$,,	6d.	5/6
4	11 ,,	$4\frac{1}{2}$,,	$2\frac{1}{2}$,,	7d.	6/
5	16 ,,	$5\frac{1}{4}$,,	$2\frac{3}{4}$,,	8d.	7/
6	22 ,,	$5\frac{3}{4}$,,	$3\frac{1}{8}$,,	9d.	7/9
7	32 ,,	$6\frac{1}{2}$,,	$3\frac{1}{2}$,,	10d.	8/6
8	46 ,,	$7\frac{1}{4}$,,	4 ,,	1/	11/
9	64 ,,	$8\frac{1}{4}$,,	$4\frac{3}{8}$,,	1/2	13/
10	90 ,,	$9\frac{1}{2}$,,	$4\frac{3}{4}$,,	1/6	18/
11	120 ,,	$10\frac{1}{2}$,,	$5\frac{1}{8}$,,	2/	24/
12	150 ,,	$11\frac{1}{4}$,,	$5\frac{5}{8}$,,	2/6	30/

208 **BEAKERS, BOHEMIAN GLASS, in Sets, same Sizes and Capacity as above.**

Sets of 3	No. 000 to 0	Per set 6d.	Sets of 5	No. 2 to 6	Per set 2 6
,, 3	,, 00 ,, 1	,, 7d.	,, 5	,, 3 ,, 7	,, 3
,, 3	,, 0 ,, 2	,, 8d.	,, 5	,, 4 ,, 8	,, 3/6
,, 3	,, 1 ,, 3	,, 10d.	,, 6	,, 0 ,, 5	,, 2/2
,, 3	,, 2 ,, 4	,, 1/	,, 6	,, 1 ,, 6	,, 2/8
,, 3	,, 3 ,, 5	,, 1/6	,, 8	,, 1 ,, 8	,, 4/3
,, 4	,, 1 ,, 4	,, 1/4	,, 10	,, 1 ,, 10	,, 6/6
,, 5	,, 0 ,, 4	,, 1/6	,, 12	,, 1 ,, 12	,, 9/6
,, 5	,, 1 ,, 5	,, 2/			

209 **BEAKERS, BOHEMIAN GLASS, Wide Form, Diameter about two-thirds the Height.**

No. 00	Capacity 1 oz.	Each 2d.	No. 7	Capacity 40 oz.	Each 1/2
,, 0	,, $1\frac{3}{4}$,,	,, 3d.	,, 8	,, 56 ,,	,, 1/4
,, 1	,, 3 ,,	,, 4d.	,, 9	,, 80 ,,	,, 1/6
,, 2	,, 5 ,,	,, 6d.	,, 10	,, 100 ,,	,, 1/8
,, 3	,, 8 ,,	,, 7d.	,, 11	,, 124 ,,	,, 2/3
,, 4	,, 12 ,,	,, 8d.	,, 12	,, 180 ,,	,, 2/3
,, 5	,, 18 ,,	,, 9d.	,, 13	,, 220 ,,	,, 2/6
,, 6	,, 27 ,,	,, 11d.			

210 **BEAKERS, BOHEMIAN GLASS, Wide Form, as 209, in Sets.**

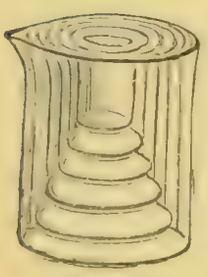
Nest of 5	Nos. 1 to 5	each set 2/6
,, 8	,, 1 ,, 8	,, 5/6
,, 15	,, 00 ,, 13	,, 12/6

211 **BEAKERS, BOHEMIAN GLASS, Tall Form, diameter about one-third the Height.**

No. 1	capacity 7 oz.	each 6d.	No. 5	capacity 32 oz.	each 1/
,, 2	,, 10 ,,	,, 7d.	,, 6	,, 50 ,,	,, 1/3
,, 3	,, 14 ,,	,, 8d.	,, 7	,, 70 ,,	,, 1/5
,, 4	,, 20 ,,	,, 10d.	,, 8	,, 90 ,,	,, 1/6

212 **Ditto, ditto.**

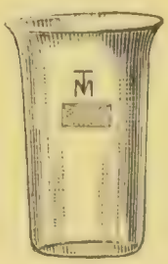
Nest of 8	Nos. 1 to 8	per set 6/



213



215



216



217



217A

213 **BEAKERS, BOHEMIAN GLASS, Tumbler Form, with Spout.**

No. 0	capacity 3 oz.	each 4d.	No. 6	capacity 40 oz.	each 1/2
,, 1	,, 5 ,,	,, 5d.	,, 7	,, 54 ,,	,, 1/4
,, 2	,, 8 ,,	,, 6d.	,, 8	,, 70 ,,	,, 1/6
,, 3	,, 12 ,,	,, 8d.	,, 9	,, 90 ,,	,, 1/9
,, 4	,, 20 ,,	,, 10d.	,, 10	,, 110 ,,	,, 2/
,, 5	,, 25 ,,	,, 1/	,, 11	,, 145 ,,	,, 2/3

214 **BEAKERS, BOHEMIAN GLASS, same capacity and form as above, in Sets.**

Sets of 3	No. 0 to 2 ...	per set 1/	Sets of 5	No. 1 to 5 ...	per set 3/
,, 3	,, 1 ,, 3 ...	,, 1/4	,, 6	,, 1 ,, 6 ...	,, 4/
,, 4	,, 0 ,, 3 ...	,, 1/10	,, 8	,, 0 ,, 7 ...	,, 5/4
,, 4	,, 1 ,, 4 ...	,, 2/	,, 12	,, 0 ,, 11 ...	,, 11/6

215 **BEAKERS, BOHEMIAN GLASS, same capacity as above, with 2 Spouts.**

2d. each Beaker extra.

216 **TOWNSON & MERCER'S TABLET BEAKERS, &c.**

The above is an application of the Sand Blast Process to Beakers, &c., forming a label on the vessels on which the substances under examination can be written with an ordinary lead pencil, thus obviating the difficulty of paper labels, which are constantly being washed off, and record of the preparation lost. Flasks, Burettes, &c., are Sand Blasted in the same way, 2d. each extra to the ordinary price.

217 **BEAKERS, BOHEMIAN GLASS, Precipitating, Conical, with Lip. Phillips' form.**

Capacity	2	oz.	each	4d.	Capacity	30 oz.	each 1/
,,	6	,,	,,	6d.	,,	40 ,,	,, 1/3
,,	10	,,	,,	8d.	,,	60 ,,	,, 1/6
,,	16	,,	,,	9d.	,,	80 ,,	,, 1/10
,,	20	,,	,,	10d.			

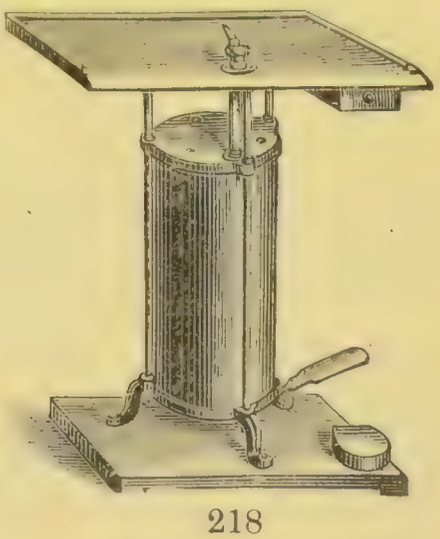
217A **BEAKERS, PHILLIPS' PRECIPITATING, Wide Mouth, Stout, with Lip, best white Crystal Glass well annealed.**

Capacity	5	10	16	20	30	40 ozs.
	5/	6/	8/	9/	12/	16/ doz.

Bell Glasses. *See Air Pump Receivers and Gas Jars.*



217B



218

217B **Beaker Flasks,** Bohemian Glass—

Capacity	100	200	400	600	800	1,000 c.c.
	3/	4/6	5/6	7/	8/6	10/6 doz.

218 **Bellows,** Double Action, Blowpipe Table with Zinc Plate Cover, Jet, and Universal Joint £4 0 0

219 ,, Ditto, with Iron Forge Plate, and Sheet Iron Cylinder ... 7 5 0

220 Gas T Union for above 0 2 6

Blowpipes for above Tables, 10/6 extra.

Bellows, Fletcher's. *For description, see Fletcher's List at end of Book.*

224 **Bladders,** prepared Stout Gold Beaters' Skin, for Gas Experiments ... ... each 0 1 6

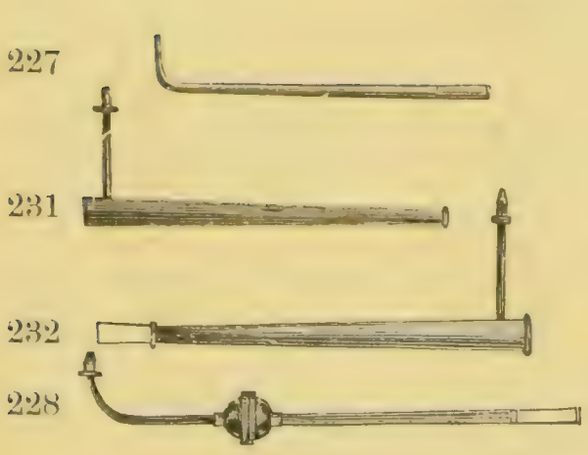
225 ,, Ditto, fitted with Brass Ferrule 0 2 3

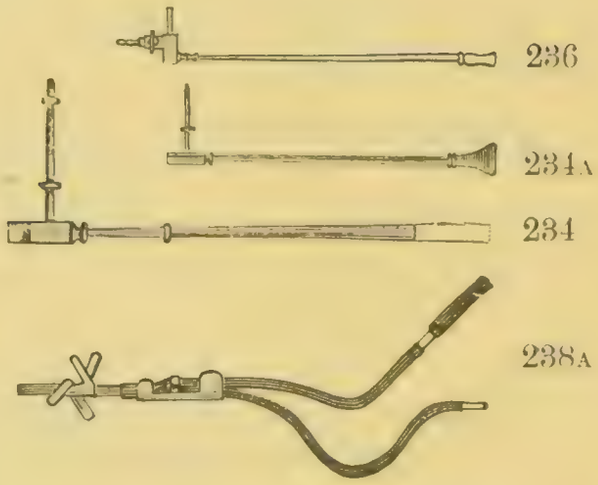
226 ,, Ditto, fitted with Ferrule, Stopcock, and Jet ... 0 5 3

226A ,, Sheep's prepared 0 1 0

226B ,, Bullocks' ,, ... 0 1 6

BLOWPIPES.





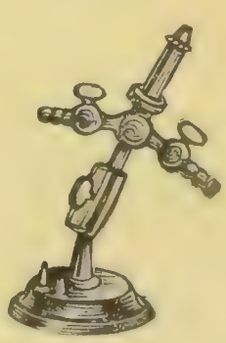
227	**Blowpipe,** common Brass ... ... per doz. 5/, each	£0	0	6
228	,, Cronstedt's, Brass, with Mouthpiece and two Jets ,,	0	2	6
231	,, Black's, Japanned Tin ... per doz. 5/ ,,	0	0	6
232	,, ,, Brass, with Ivory Mouthpiece ... ,,	0	1	6
233	,, ,, ,, larger ,, ... ,,	0	1	9
233A	,, ,, ,, ,, Nickel Plated ... ... ,,	0	1	9
234	,, Plattner's, with Hard Soldered Platinum Tip ,,	0	3	0
234A	,, ,, Brass, with Trumpet Mouthpiece with two Jets one Platinum tipped ,,	0	3	6
235	,, ,, with Moveable Platinum Jet ... ,,	0	4	0
236	,, ,, with Gas Connector and Stopcock ,,	0	5	6
238A	,, Moor's New Mouth, for Analysts, Jewellers, &c., giving a well defined inner and outer flame ,,	0	2	6



239

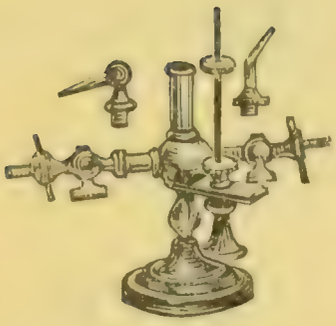


240



242

239	**Blowpipe,** Gas. With Universal Joint	£0	7	6
240	,, ,, With two Stopcocks, Universal Joint, and two extra Jets ... ... 10/6 and	0	15	0
242	,, Best Nickel Plated with Universal Joint	0	17	6



241



246



246A

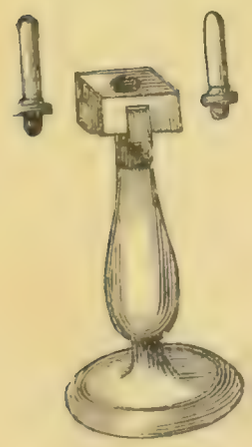
241 **Blowpipe,** Oxyhydrogen, Palmer's, with two Platinum Jets, and Lime Holder, on Stand £2 5 0

246 „ Oxyhydrogen, for Lime Light, mounted on tall Stand, with a Sliding Rod to adjust the Lime Cylinder 1 5 0

Blowpipes, Fletcher's. *For Prices and Illustrations, see Fletcher's List at end of Book.*

246A **Bellows,** Double, with Receiver, for hand use ... 1/3, 1/6 and 0 2 6

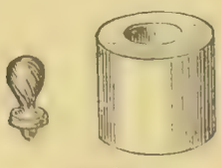
BLOWPIPE APPARATUS, PLATTNER'S, FOR CUPELLATION.



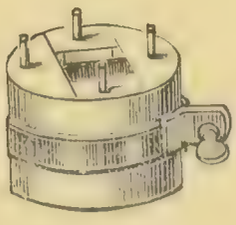
247

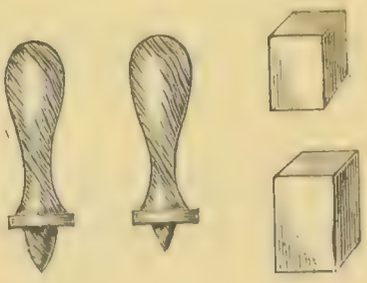


251



252





253

247 Plattner's Mould with support, Polished Hardened Steel ... £0 10 6

248 „ „ „ „ Iron 0 7 0

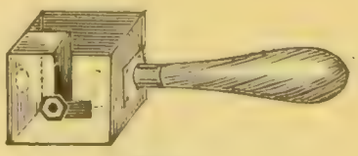
251 Boxwood Pestle with Graduated Glass Tube for Test Lead ... 0 2 0

252 Mould for making Charcoal Capsules, ¾ in. 0 2 0

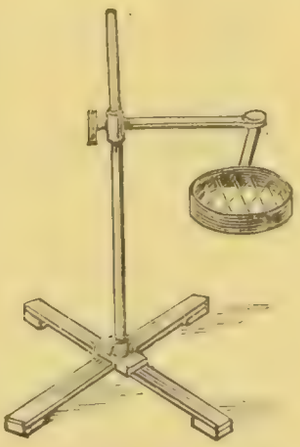
253 Mould for preparing Blocks of Charcoal for Roasting in the Analysis of Metallic Ore ... ...the set 0 10 6

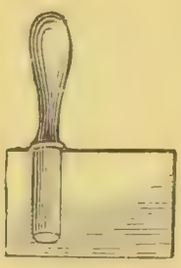


254


255


256


258


266


267

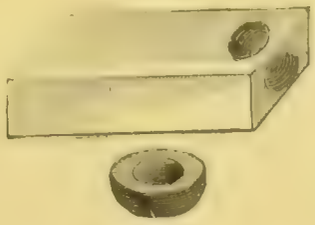

268

254	Mould for making Cylindrical Blocks of Charcoal with Crucible Cavity ... ... the set	£0	6	0
255	Roasting Furnace for Square Blocks of Carbon	0	6	0
256	Mould for making Capsules of Porcelain or Clay, Gun Metal, in 4 pieces	0	10	6
257	Box Mould for making Capsules	0	2	0
258	Trellis Support	0	6	0
259	Iron Ring, fitted with Triangle, for the above	0	3	0
260	Blowpipe Jets, Straight or Curved, for Bladder of Oxygen ...	0	2	6
261	Blowpipe Jets, of Platinum ... ... each 2/6 and	0	3	6
262	Blowpipe Charcoals, Swedish, 2 in. × 1 in. ... per doz.	0	2	0
263	,, ,, large blocks, about 6 in. × 2 in. ... each	0	0	6
264	,, ,, Blocks Compressed Carbon, 6 in. × 1¼ in. × 1¼ in.	0	0	6
	,, ,, ,, ,, 4 in. × 4 in. × 1¼ in.	0	0	8
265	,, ,, Charcoal Saw	0	1	6
266	,, Boxwood Mould to assist in rolling paper into case ...	0	0	6
267	,, Cupel Mould in Polished Boxwood—			
	1 1¼ 1½ 2 inches			
	2/6 3/6 4/ 5/			
268	Boxwood Mallet for ditto	0	2	6
268A	Mohr's Scale of Hardness, in Card Box, with File, without Diamond	0	5	6
	,, ,, with File and Streak Plate	0	6	6
	,, ,, in stained Wood Box, with Diamond mounted in holder ... 12/, 15/, or	1	1	0
268B	Collection of the most useful Minerals and Metals, in Wooden Case.			
	Set of 40 specimens	0	12	6
	,, 80 ,, ...	1	1	0
	,, 100 ,, 2 trays	1	15	0
	Ditto, in Polished Mahogany Cabinet.			
	150 specimens, 3 trays	3	3	0
	160 ,, 3 ,, ...	4	4	0
	200 ,, 4 ,, ...	6	6	0

Other special collections made to order.

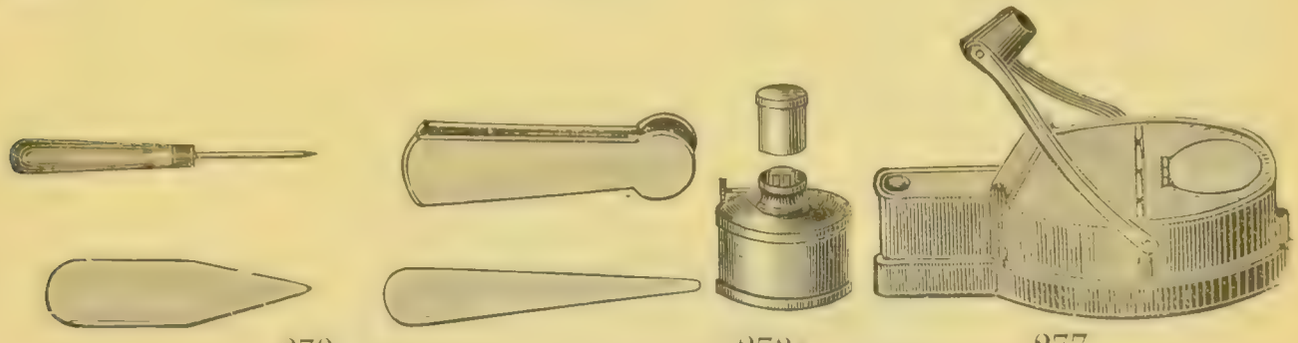
269	Cobalt, Green, Yellow and Red Glass, for Blowpipe work—				
	3 in. × 1 in.	per doz.	£0	1	9
	4 in. × 4 in.	,,	0	3	0
	6 in. × 6 in.	,,	0	5	0

269B

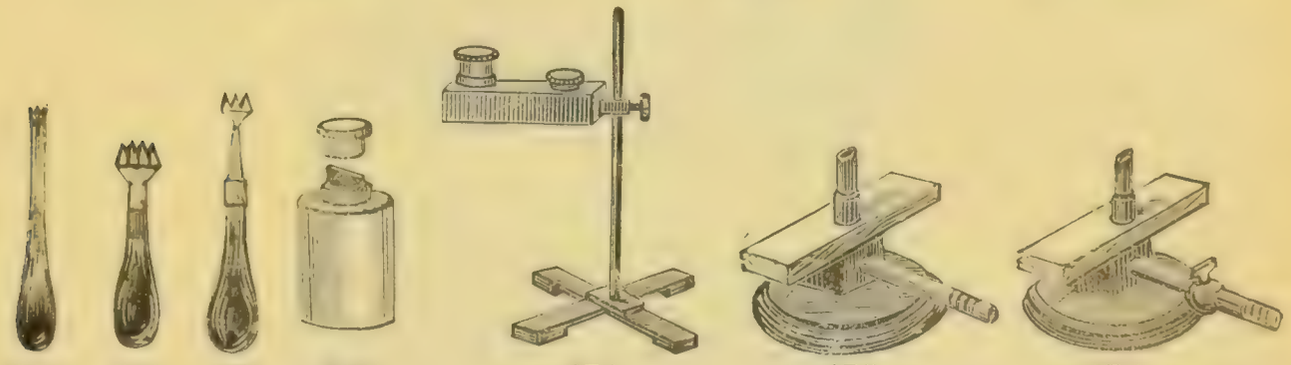


269A

269A	Charcoal Pastilles	per gross 3/6 ; per doz.	£0	0	4
269B	,, Support, Biscuit Porcelain	each	0	0	6



279 273A 277



270 271 272 273 274 275 276

270	Charcoal Borer, Steel, with Spatula End...		£0	1	0
271	,, ,, with Wood Handle, for Holes $\frac{3}{4}$ in. diameter ...		0	4	0
272	,, ,, ,, ,, ,, $\frac{3}{8}$ in. ,, ...		0	2	0
273	Oil Lamp, Brass, with Flat Wickholder, and Brass Screw Cap, 3/ &		0	3	6
273A	Spirit Lamp, Brass, with Rack and Pinion for Wick, with loose top—				
	Capacity 3 5 oz.				
	2/ 2/6 each				
274	Oil Lamp, on Brass Stand, with Folding Legs, Portable ...		0	8	6
275	Gas Burner, with Wood Support, for Blowpipe Experiments ...		0	1	9
276	,, with Stopcock		0	3	0
277	Lamp Glass Blowers, Tin, with Hood, and arrangement altering the size and height of Wick, and Tray for overflow of Oil ...		0	4	6
278	Cotton Wick for ditto	per bundle	0	0	6
279	Set Glass Blower's Tools, consisting of Flat Tongs, Iron Rod in Handle, Iron Cone, Flat Iron Plate		0	2	6



280



281



282

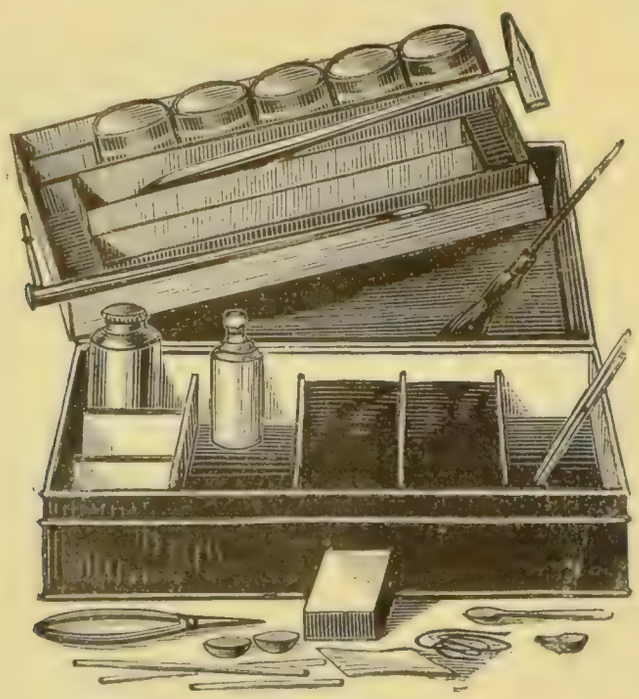


283



284

280	Platinum Spoon and Wire Holder, with Wood Handle ...	£0	1	6
281	,, Spoon ... ... 2/6, 3/6 and	0	4	6
282	Porcelain Cups ... ... each 3d., 4d., 6d., and	0	0	8
283	Steel Hammer, with Chisel End	0	2	0
284	,, Anvil $1\frac{1}{2}$ in. × $1\frac{1}{2}$ in. × $\frac{1}{2}$ in.	0	1	0
284A	,, ,, 4 in. × 4 in. × 1 in.	0	5	6
285	Tubes of Hard Glass, closed at one end ... ... per doz.	0	1	6
286	,, ,, ,, 6 in. × $\frac{1}{4}$ in., open both ends ,,	0	0	9
286B	Plattner's Ivory Scale for measuring silver beads	0	15	0



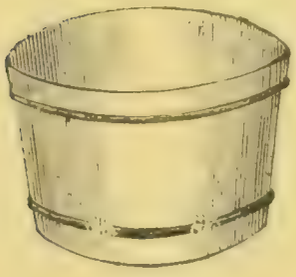
287

287 **Blowpipe Cabinet** in Japanned Tin Case, for the Pocket—Size of Case, 9 in. × 5 in. × 3 in. Brass Black's Blowpipe, Brass Oil Lamp, Steel Hammer and Anvil, Platinum Spoon, Platinum Wire and Foil, Steel Forceps, German Silver Test Spoon, File and Handle, 2 Porcelain Cups, assortment of Hard Glass Tubes closed and open. Charcoals. BLOWPIPE RE-AGENTS:—Borax, Sodium Carbonate, Microcosmic Salt, Potassium Nitrate, Cobalt Nitrate, and Potassium Bisulphate £1 1 0

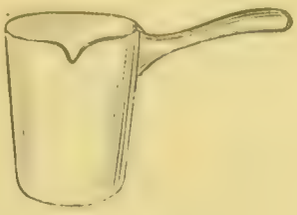
The above with Agate Mortar and Platinum Pointed Forceps, 7/6 extra.

287A **Blowpipe Cabinet,** Polished Mahogany, size 11 in. × 7 in. × 4 in., containing all the necessary Re-Agents and Apparatus for Blowpipe Analysis £6 6 0

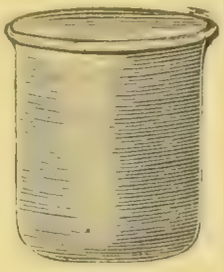
287B Balance, Portable, for Blowpipe Work, in Polished Wood Case, complete with Set of Silver Weights, 2 grammes to $\frac{1}{10}$th milligramme, Ivory Spoon, Forceps, Brush and 2 extra Scale Pans £3 3 0



288



290



295

288 **Boilers** or Solution Pans, German Porcelain, glazed inside and out, capacity 12 pints each £0 8 6

289 ,, ,, ,, ,, 28 ,, 0 18 6

290 ,, Porcelain, German, with Handles, glazed inside and out, capacity $\frac{1}{2}$ litre 0 2 6

291 ,, ,, ,, ,, ,, ,, 1 ,, 0 3 0

292 ,, ,, ,, ,, ,, ,, $1\frac{1}{2}$,, 0 3 6

293 ,, ,, ,, ,, ,, ,, 2 ,, 0 4 6

294 ,, ,, ,, ,, ,, ,, 3 ,, 0 5 6

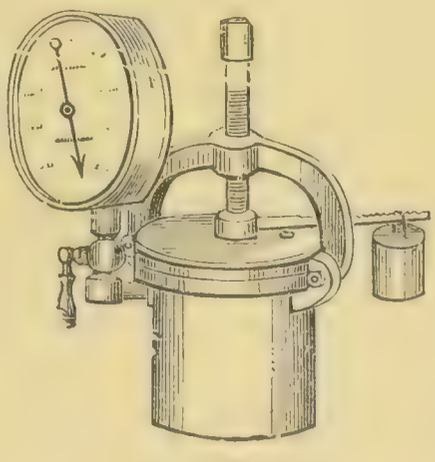
295 ,, Saltglazed Stoneware, for Dyers, &c., 2 galls. 0 4 6

296 ,, ,, ,, ,, 3 ,, ... 0 6 0

297 ,, ,, ,, ,, 5 ,, ... 0 10 6



298



302

298 **Boilers**, Digesters, Cast Iron, lined with China, with Valves. Capacity—1 gall. 7/, $1\frac{1}{2}$ gall. 9/, 2 galls. £0 11 6

299 ,, Iron, 2 Atmospheres 1 10 0

300 ,, ,, 5 ,, Turned and Ground Bearings with Gun Metal Valves 5 0 0

301 ,, Do. do. Turned inside. 6 0 0

302 ,, Digester, Papyn's, in Solid Copper, lined with Pure Tin, fitted with Lever Valve, Bridge Clamp and Screw, Steel Bolts and Nuts, and Bourden Pressure Gauge, capacity about 2 quarts 10 10 0

Digesters, Copper or Iron, made to Order.


303


304


307


308



309

303 **Bottles,** English Flint Glass, for Test Solutions, Stoppered, Moulded, Narrow Mouth.

Capacity	¼	½	1	2	3	4	6	8	oz.
	2/	2/3	2/6	3/	3/3	3/6	4/	4/6	per doz.

304 **Bottles,** English Flint Glass, for Dry Chemicals, Stoppered, Moulded, Wide Mouth.

Capacity	¼	½	1	2	3	4	6	8	oz.
	2/3	2/6	2/9	3/	3/6	4/	4/6	5/	per doz.

305 **Bottles,** Best English Flint Glass, for Test Solutions, &c., Closely Stoppered, Narrow Mouth, as Fig. 303.

3 oz.,	Hand-made	per doz.	5/6	16 oz.,	Hand-made	per doz.	9/6
4 ,,	,,	,,	6/	20 ,,	,,	,,	10/
6 ,,	,,	,,	6/6	30 ,,	,,	,,	13/
8 ,,	,,	,,	7/6	40 ,,	,,	,,	16/
10 ,,	,,	,,	8/6	60 ,,	,,	,,	21/
12 ,,	,,	,,	9/	80 ,,	,,	,,	34/

306 **Bottles,** Best English Flint Glass, for Dry Chemicals, Closely Stoppered, Wide Mouth, as Fig. 304.

1 oz.,	Hand-made	per doz.	4/4	12 oz.,	Hand-made	per doz.	10/
2 ,,	,,	,,	5/6	16 ,,	,,	,,	10/6
3 ,,	,,	,,	6/	20 ,,	,,	,,	11/
4 ,,	,,	,,	6/6	30 ,,	,,	,,	14/
6 ,,	,,	,,	7/6	40 ,,	,,	,,	17/
8 ,,	,,	,,	8/	60 ,,	,,	,,	22/
10 ,,	,,	,,	9/	80 ,,	,,	,,	36/

307 **Bottles,** Best Stout German Glass, Flat Stoppers, free from Lead, very accurately Stoppered, Stopper and Bottle Numbered, Narrow Mouth for Test Solutions.

1 oz.	...	per doz.	4/6	16 oz.	...	per doz,	12/6
2 ,,	...	,,	5/6	24 ,,	...	,,	14/
4 ,,	...	,,	6/6	32 ,,	...	,,	18/
6 ,,	...	,,	7/6	48 ,,	...	,,	22/
8 ,,	...	,,	9/	64 ,,	...	,,	30/
12 ,,	...	,,	11/6	100 ,,	...	,,	36/

308 **Bottles,** Best Stout German Glass, Ditto, Wide Mouth for Dry Chemicals, &c.

1 oz.	...	per doz.	6/	16 oz.	...	per doz.	15/
2 ,,	...	,,	7/	24 ,,	...	,,	18/
4 ,,	...	,,	8/	32 ,,	...	,,	22
6 ,,	...	,,	9/	48 ,,	...	,,	26
8 ,,	...	,,	10/	64 ,,	...	,,	36/
12 ,,	...	,,	13/	100 ,,	...	,,	45/

The above Bottles Labelled, Sand Roughened, at 4/ per doz.

308A **Bottles,** German Glass, Flat Stopper, Second Quality, especially recommended for Laboratory Fittings for Institutions, Colleges, &c.

Capacity	1	2	4	6	8	12	16	20	32	48 oz.
N.M.	2/6	2/6	2/9	3/6	4/	4/6	5/	5/6	9/	14/ per doz.
W.M.	2/6	2/9	3/	3/9	4/3	5/	5/6	6/	10/6	16/ per doz.

309 **Bottles,** Best Stout German Glass with Plain and Octagon Cut Glass Stoppers. Bottles and Stoppers Numbered, with Enamelled Labels Burnt in, for Acids, &c.

			Plain.	Cut Stoppers.				Plain.	Cut Stoppers.
6 oz.	...	each	1/9	2/	16 oz.	...	each	2/6	3/
8 ,,	...	,,	2/	2/3	24 ,,	...	,,	3/	3/6
12 ,,	...	,,	2/3	2/9	32 ,,	...	,,	3/6	4/

309A **Bottles,** Actinic—Green.

Capacity	4	8	12 oz.
N.M.	4/	6	8/ per doz.



310



312



313



314

310 **Bottles,** English, Narrow Mouth, Blown Glass, Clear, for Samples.

Capacity	1	2	4	6	8	10	16	20 oz.
	1/9	2/	2/6	3/	3/3	3/6	4/	4/6 per doz.

311 **Bottles,** French, Narrow Mouth, Moulded, Round Shouldered.

Capacity	1	2	4	10	16	20 oz.
	7/6	8/6	10/6	18/	25/	30/ per gross

Corks for above, 2/ to 5/ per gross.

312 **Bottles,** French, Clear White Glass, Wide Mouth, Round Shouldered, for Samples. Kalis.

Capacity	1	2	4	8	16	20 oz.
	9d.	10d.	1/	1/6	2/6	3/ per doz.
	7/6	8/6	10/6	14/6	25/	30/ per gross

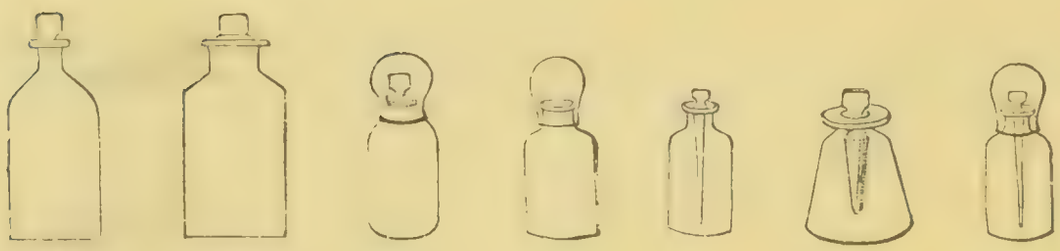
313 **Bottles,** Clear White Glass, Square Shoulders, for Samples, Wide Mouth.

Capacity	1 oz	Per gross	9/	Per doz.	1/
,,	2 ,,	,,	10/6	,,	1/2
,,	3 ,,	,,	12/6	,,	1/4
,,	4 ,,	,,	15/	,,	1/6

Corked, 4/ to 6/ per gross extra.

314 **Bottles,** with Polished Wood Top and Cork, Wide Mouth, for Samples, &c.

Capacity	1	2	3	4	6	8 oz.
	1/6	1/9	2/	2/3	2/9	3/3 per doz.



316 317 318 319 320 321 322

316 English Green Glass Stoppered Bottles for Acids, &c., and Storing Chemicals in larger quantities.

	Capacity	¼	½	1	2	4 pints
	N.M.	4/	4 6	5/	7/	9/ per doz.
317	W.M.	5/	5/6	6/6	9/	12/ per doz.

318 English Flint Glass Bottles, Stoppered, and Ground Glass Cap for Ether, &c.

Capacity	½	1	2	4	6	8	16	20	40 oz.
	1/3	1/3	1/6	1/9	2/	2/3	3/	3/6	4/6 each

319 English Flint Glass Bottles, without Stopper, Wide Mouth, Ground Glass Cap.

Capacity	2	4 oz.
	1/	1/3 each

320 **Bottles,** with long Stopper, Jewellers', for Aqua Fortis, each £0 1 0

321 ,, ,, Conical form ... ... ,, 0 1 0

322 ,, German, Capped and long Stoppered, 2 oz. ... ,, 0 1 0



323 324 325 326 327 327A

323 **Bottles,** Gutta Percha, for Fluoric Acid.

Capacity	2	4	8	12	16	32 oz.
	1/3	1 6	2/6	3/	3/6	5/ each

324 **Bottles,** Clear Glass, made from Tube, for Specimens.

Length	1½	2	2½	3	3½	4	1½	2	2½	3	3½ in.
Diam.	½	½	½	½	½	½	⅝	⅝	⅝	⅝	⅝ in.
	7/	8/	9/	10/	12/	14/	7/	9/	10/	12/	14/ per gross

Length	4	5	5½	2	2½	3	3½	4	5	6 in.
Diam.	⅝	⅝	⅝	¾	¾	¾	¾	¾	¾	¾ in.
	15/	16/	18/	9/	10/	12/	14/	15/	16/	20/ per gross

Corks for above, 1/6 per gross.

325 **Bottles,** Clear Glass, made from Tube, Stoppered, for Weighing and Specimens.

Length	2	2½	3	4 in.
	⅜	⅜	⅜	½ in.
	2/6	2/9	3/	3/6 per doz.

326 **Bottles,** with Lip, Specimen Tubes, 2½ in. × ⅜ in., 6d. per doz., 1/ per gross.

327 ,, Tube, Plain, Clear Glass, without Lip, for Specimens, Powders, &c.

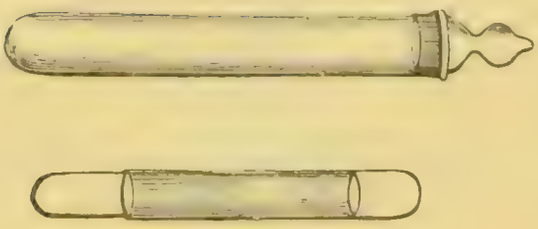
Length	1½	2	2½	3	4	5	2½	3	4	5	6 in.
Diam.	⅜	⅜	⅜	⅜	⅜	⅜	¾	¾	¾	¾	¾ in.
	3/	4/	7/	8/	10/	12/	8/	10/	12/	14/	16/ per gross

Corks for above, 1/6 per gross.

327A **Bottles,** Square, W.M., for Sugar Samples.

Capacity 4 oz. ... ... per doz. £0 4 0

328



329



330



331



332

328 **Weighing Tubes,** for Filters—

Length	3 in.	Diameter	½ in.	Each	6d.
,,	4 ,,	,,	⅝ ,,	,,	8d.
,,	4½ ,,	,,	¾ ,,	,,	9d.

329 ,, For Filters, the inner Tube fitting closely, Length 2½ in., Diameter ⅝ in. ...per pair 3d., per doz. £0 2 6

330 ,, Stoppered, with Wide Neck—

Height to Neck	2 in.	Diameter	1 in.	Each	8d.
,,	2½ ,,	,,	1⅛ ,,	,,	9d.
,,	3 ,,	,,	1⅛ ,,	,,	10d.

331 **Weighing Bottle,** with Stoppered Cap, Diameter at Base 1½ in., capacity about 20 c.c. ... ... each 0 0 8

332 ,, With Stopper, without Neck, same diameter throughout.

3 × 1	3 × 1⅛	3 × 1¼ in.
10d.	1/	1/3 each



335

333 **Bottles,** Tin, Square, for Methylated Spirits &c.

Capacity	½ gall.	1 gall.	2 gall.
	7d.	9d.	1/4 each

334 ,, Stoneware.

Capacity	½	gallon,	each	8d.	
,,	,,	1	,,	,,	1/
,,	,,	2	,,	,,	2/

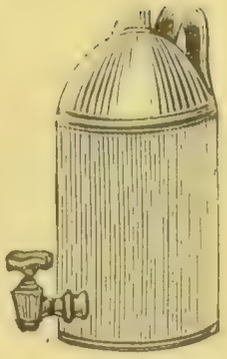
335 ,, Stoneware, covered with Wicker.

Capacity	½	1	2	3	4	gall.
	1/9	2/3	3/	4/6	5/6	each


336


338


339


340

336 **Bottles,** Bohemian Glass, with Tubulure at Bottom (*Aspirators*).

Capacity	20	40	80	100	150	250	500 oz.
	1/6	1/9	2/6	4/	5/	8/6	12/ each

337 **Bottles,** German Glass. As Fig. 336.

Capacity	16	20	40	60	80	100	150	250	500 oz.
	1/3	1/4	1/6	2/	2/6	3/	4/6	7/6	10/ each

338 **Bottles,** Bohemian Glass, with Glass Stopcock Ground in at Bottom.

Capacity	20	40	80	100	150	250	500 oz.
	4/	5/	7/	8/	10/	14/	18/ each

339 **Bottles,** German Glass, with Glass Stopcock Ground in at Bottom.

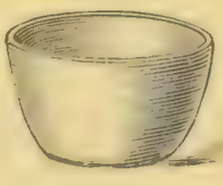
Capacity	20	40	60	80	100	150	250	500 oz.
	3/6	4/3	4/9	5/	5/6	7/6	9/	15/ each

340 **Bottles,** Stoneware, with Stoneware Stopcock Ground in at Bottom.

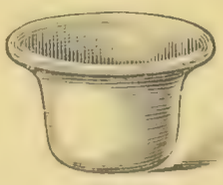
Capacity	2	4	6	10	20 gallons
	7/6	9/6	12/6	25	35/ each

CAPSULES, PORCELAIN, FOR IGNITION, &c


342


343


344


345

342 **Capsules,** Berlin Porcelain, for ignition—

1	$1\frac{5}{8}$	$1\frac{3}{4}$	2	$2\frac{3}{8}$	$2\frac{5}{8}$ in. diam.
3d.	5d.	6d.	8d.	10d.	1/ each

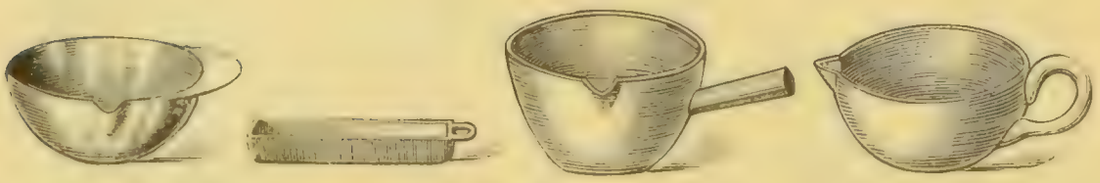
343 ,, Dresden Porcelain—

$1\frac{3}{16}$	$1\frac{1}{2}$	2 in.
3d.	4d.	6d. each

344 ,, ,, Plattner's, Conical form, with Cover, diam. $1\frac{1}{2}$ in., 5d each.

345 ,, ,, Porcelain (Plattner's Digester)—

$1\frac{3}{4}$	$2\frac{1}{4}$ in diam. at top
6d.	8d. each



346 347 348 349

346 **Capsules,** Platinum, per oz. weight, Troy, 50 . Numbered 1 to 6, for Milk Analysis.

347 ,, Dresden Porcelain, Boat Form (Combustion Boats), for igniting in Combustion Tubes.

$1\frac{3}{4}$ in. × $\frac{1}{2}$ in.	3 in. × $\frac{1}{2}$ in.	3 in. × $\frac{5}{8}$ in.	4 in. × $\frac{3}{4}$ in.
4d.	4d.	4d.	6d. each

348 ,, Berlin Porcelain, with Handle and Spout—

	2	$2\frac{3}{4}$	$3\frac{1}{4}$	$3\frac{3}{4}$ in. diam
Capacity	1	2	5	8 oz.
	10d.	1/	1/3	1/9 each

349 ,, Dresden Porcelain, with Ring Handle and Spout—

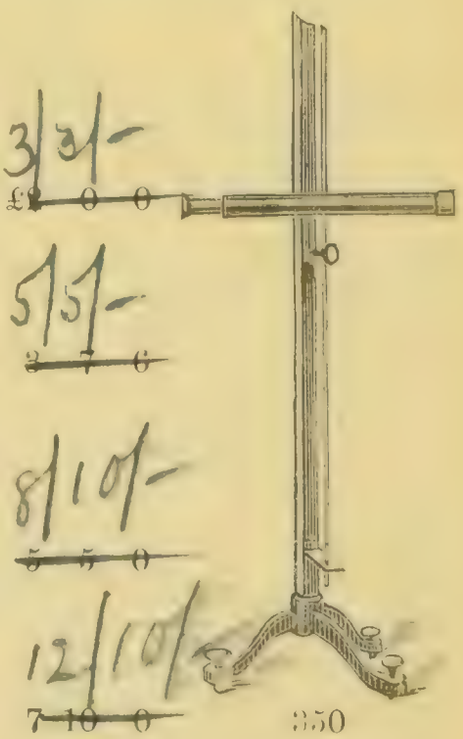
$1\frac{3}{4}$	$2\frac{3}{4}$	$3\frac{3}{4}$	$4\frac{3}{4}$	6 in.
7d.	8d.	9d.	1/6	3/6 each

350 No. 1, **Cathetometer**, Polished Mahogany, about 4 ft. high, mounted on Iron Tripod Stand, with Levelling Screws, fitted with Telescope and Plumb Line, Brass Scale 12 in. divided into $\frac{1}{10}$ths. Focal length about 4 ft. ... ... 3/2/- ~~£2 0 0~~

No. 2, **Cathetometer**, same as above, with Rack Adjustment for Telescope, Cross levels. Scale divided into millimetres ... ... 5/5/- ~~2 7 6~~

No. 3, **Cathetometer**, square Brass Pillar mounted on Tripod, with Levelling Screws, fitted with Telescope and Cross levels. Scale 12 in. divided into millimetres with vernier ...about 8/10/- ~~5 5 0~~

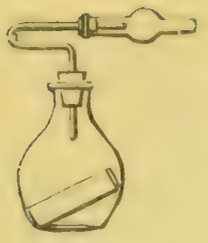
No. 4, Same as above, fitted with Telescope working on centre, with Cross levels, Rack Adjustment. Scale 24 in. divided into millimetres, with vernier, about 12/10/- ~~7 10 0~~



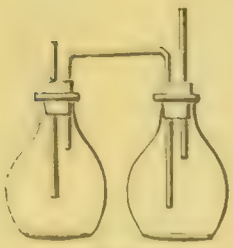
350

CARBONIC ACID APPARATUS.

For the Estimation of Substances containing Carbonic Acid.



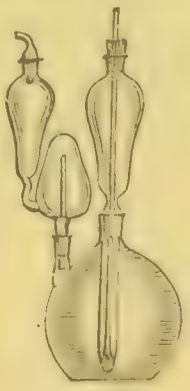
351



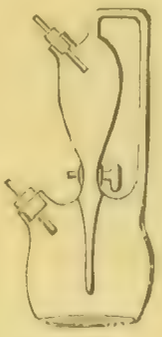
352



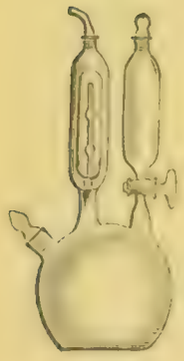
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355



356



358



359



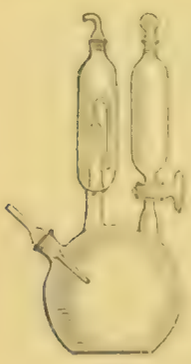
360



361



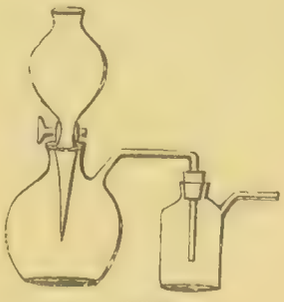
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363



364



365



366



367

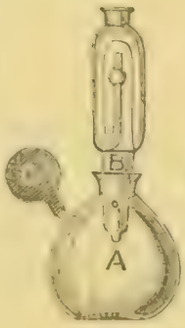
351	Parnell's ... ... each	£0	1 3
352	Fresenius & Wills	0	1 0
354	Geissler's Stoppered	0	4 6
355	Erdmann's Stoppered	0	4 6
356	Kipp's Stoppered	0	4 0
358	Schrotter's Stoppered	0	4 0
359	,, ,, with extra Tube	0	4 6
360	Townson's	0	3 6
361	Rose's	0	3 6
362	Fritsche's	0	0 10
363	Rohrbeck's Stoppered	0	5 0
364	Geissler's Stoppered	0	4 6
365	Kipp's	0	4 6
366	Geissler's	0	4 0
367	,, ...	0	4 6



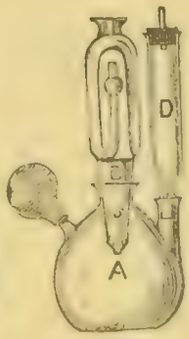
368



368A



368B



368C



368D



368E

368 **Carbonic Acid Apparatus**, Geissler's, with improvement by Cochins, Tube inside being turned can be closed or left open £0 5 0

368A ,, Bunsen's... ... ... 0 3 0

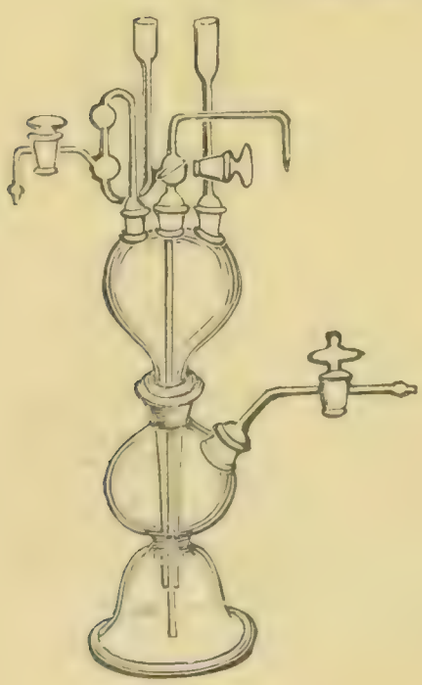
368B ,, Greiner and Friedrich's new form. The advantage gained by this Apparatus is that the Sulphuric Acid contained in the upper part is used for evolving and drying the Carbonic Acid. In order to displace the Sulphuric Acid a slight compression of the India rubber bag is sufficient. The Sulphuric Acid cannot rush into the evolution flask direct, being retained in the adjoining dropping tube, which discharges its contents by drops. By means a boisterous evolution of the CO_2 will be avoided. The Carbonic Acid arises through the upper hole of the dropping tube into the Syphon tube and escapes after having passed the Sulphuric Acid. This apparatus is light and can be easily managed, but attention must be paid to displace only a small quantity of Sulphuric Acid at first 0 4 0

368C ,, Greiner and Friedrich's new form, with separate Drying Tube. The Drying Tube *D* can be either filled with Chloride of Calcium or with pieces of Pumice, saturated with Sulphuric Acid. The Tube *B* can be charged with Sulphuric, Hydrochloric or Nitric Acid. The small tube on the top of Tube *D* can be closed by means of a light valve consisting of a small glass bulb or a piece of cork pierced by a needle in order to prevent the entrance of air, otherwise this tube must be closed with the finger for a moment when the pressure on the India rubber bag relaxes 0 5 0

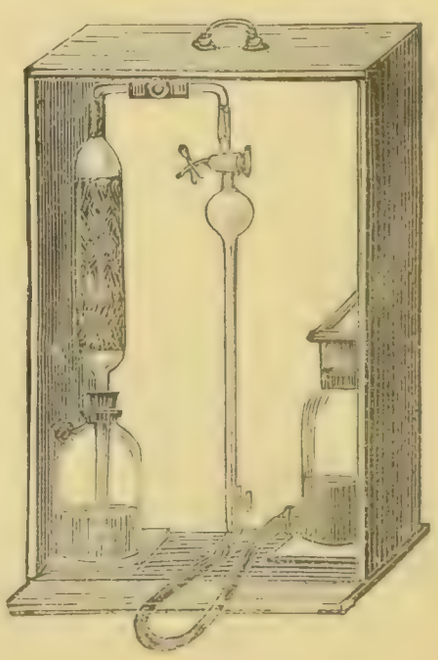
368D ,, Similar to the former 0 4 0

368E ,, Friedrich's, improved, without Chloride Calcium Tube 0 3 0

With Calcium Tube attached 0 3 6



369

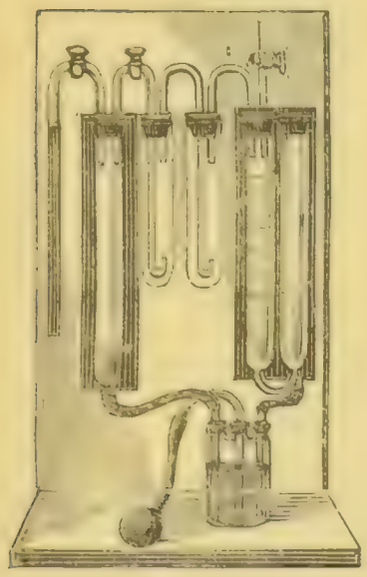


370

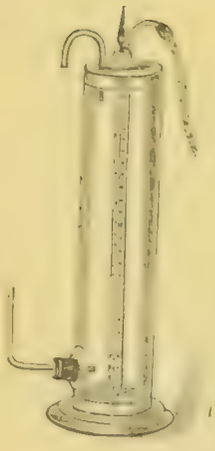
369 **Carbonic Acid Apparatus**, Muencke's £2 10 0

370 ,, Winkler's, in Wood Case complete 2 5 0

Glass Parts only 1 10 0



371



371A



372







373

371 **Sidersky's Apparatus**, for estimation of Carbonic Acid in saturation, on Stand £2 0 0

371A ,, Calcimeter, with Graduated Burette 0 16 0

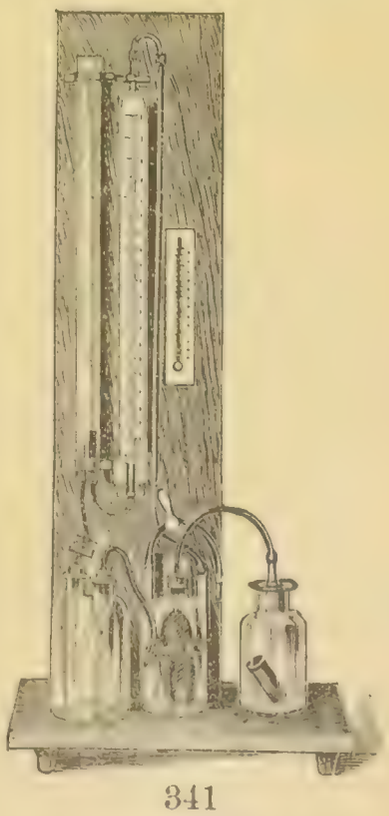
311 **Calcimeter, Schiebler's**, for the Quantitative Estimation of Carbonate of Lime. On Stand, complete, with instructions ... £2 5 0

Spare Bottle, with Stopper and Stoppered Tube ... ... each 0 2 6

Spare India Rubber Bladder each 0 1 0

372 **Schuman's Apparatus**, to estimate the Specific Weight of Cement 0 5 0

373 **Hydrotimeter**, Boutron and Boudet, for the estimation of Chalk in Water 0 5 0



341



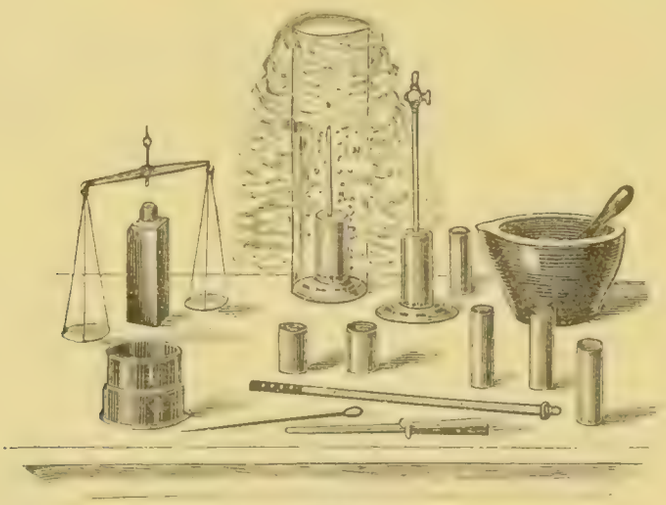
374



375

374 **Carbonic Acid Apparatus**, for the collection of Carbonic Acid Gas from Spirit Lamp, &c. £0 2 0

375 „ For Constant Supply, capacity of Lower Flask and Upper Bulb about 1 litre, U Tube 8 in. × 1 in., complete with Stand 0 10 6



375A

375A **Calorimeter, or Fuel Tester**, Thompson's, for determining the Heating Power of Coal, &c., complete in Mahogany Case, with Book of Instructions £5 10 0



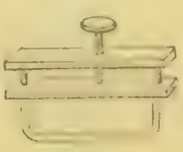
376



378



379



380

376 **Clips**, for Mohr's Burettes, No. 1 small each 3d. per doz. £0 2 9

„ „ „ „ 2 medium „ 4d. „ 0 3 6

„ „ „ „ 3 large „ 5d. „ 0 4 3

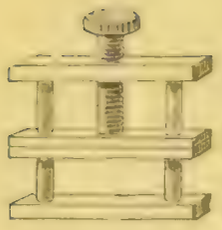
377 „ „ „ „ 4 extra strong ... ... each 0 0 6

378 „ „ „ Brass, with Screw ... ... „ 0 0 6

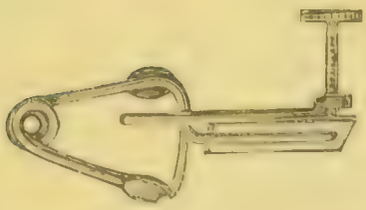
379 „ Bunsen's ... ... „ 0 0 10

380 **Clamp**, with Screw, for Connections, &c., Nickel Plated—

¼	½	¾	1 in.
6d.	7d.	8d.	9d. each



380A



381



382

380A **Clamp**, Improved, with Double Centre Bar and Flat Bottom.

½	¾	⅞	1 in. inside
10d.	10d.	1/	1/ each

381 „ Brass, for India Rubber Tube, with flat Brass Plate and Screw £0 0 10

382 „ for India Rubber Tube, the bottom part with hinge, enabling the removal without unscrewing.

No. 1	2	3	4
Diameter about ½	¾	⅞	1 in. inside
Nickel Plated 8d.	9d.	10d.	1/ each



382A



382B



382C

382A **Camel Hair Brushes**, small, medium and large, per doz. 6 l., 1/ & 1/6.

382B „ „ „ Flat, Tin Bound.

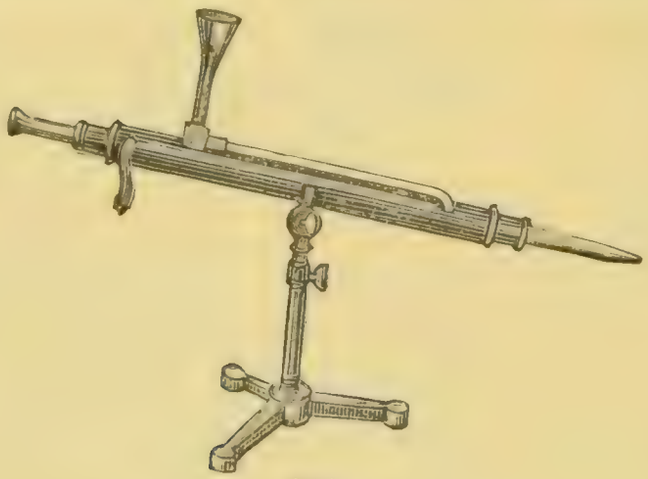
½	¾	1	1½	2	2½	3 in.
3d.	4d.	5d.	6d.	8d.	9d.	1/ each

382C „ „ „ Round, or Dabbers, per doz. 4/.

No. 1	2	3	4	6	8
2/	2/6	3/	3/6	5/	8/ per doz.

CONDENSERS, GLASS, &c.,

For use with Retorts in the Distillation of Alcohol, Acids, &c.

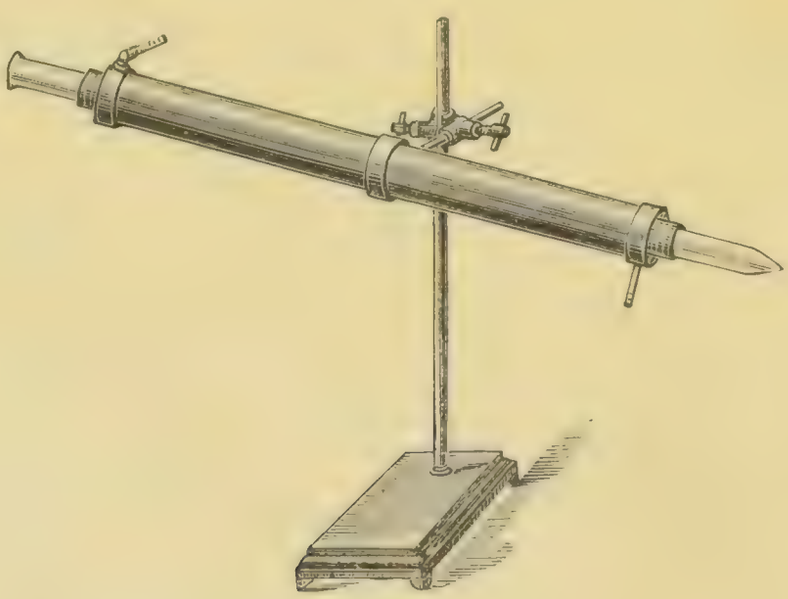


383

383 **Condensers,** Liebig's, Copper, Japanned Body, length 18 in., with Glass Tube, on Iron Tripod Foot, for the Distillation of Spirits, Water, &c., with Joint and Brass Telescope Slide, Glass Tube 38 in. long by $\frac{7}{8}$ in. diam., complete each £0 15 0

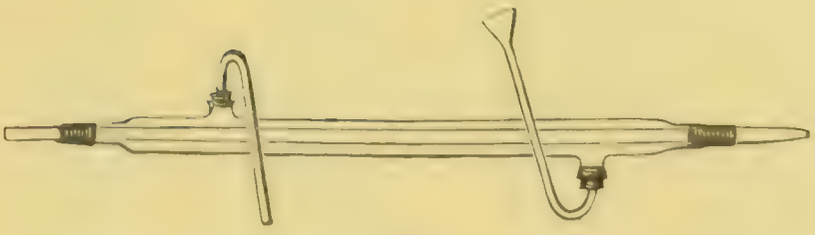
384 ,, Do. do. Body 24 in., Glass Tube 38 in. by $1\frac{1}{8}$ in., each 1 1 0

385A ,, Do. do. Japanned Zinc Body 18 in., Tube 38 in. by $\frac{7}{8}$ in., same construction as above, with Telescope Slide, complete 0 12 6



385B

385B **Condensers,** Bright Brass Body, with inlet and outlet for connecting, with Rubber Tube, mounted on strong Iron Stand £1 5 0



386

386 **Condensers**, Liebig's, Glass Body and Tubes—

Length of Body	12	15	18	21	24	28	in.
Diameter	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	2	2	in.
Diameter of Tube	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	in.
	2/6	2/9	3/	3/6	4/	5/	each

387 Glass Bodies only for the above, 1/3, 1/6, 1/9, 2/, 2/9, 3/6 each.



388

388 **Condensers**, Dr. Graham's, German Hard Glass—Diameter of outer Tube 1 in., 30 in. long, fitted with bent inner Tube, Corks, and Adapter, complete ... ... each £0 2 6

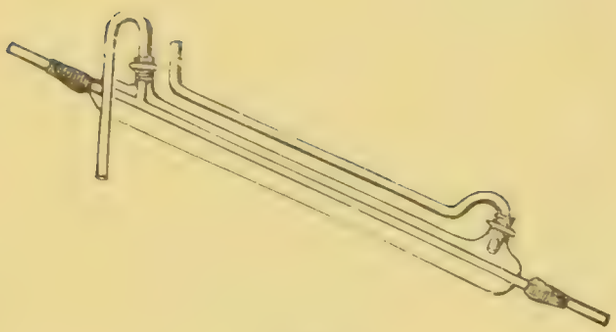
389 „ Do. do. Fitted with India Rubber Corks 0 3 6



390

390 **Condenser Tubes**, Glass, for Liebig's Condensers—

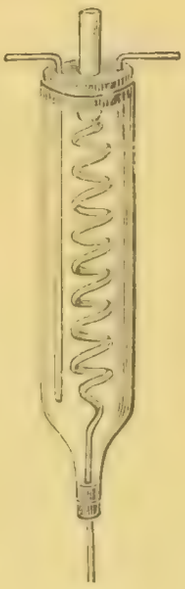
Length	38	38	38	38	38 in.
Diam.	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$ in.
	1/2	1/3	1/4	1/9	2/3 each



391



392



393



393B

391 **Condensers**, Liebig's, modified by Cloez—

Length of Body 15 18 21 in.

3/ 3/6 4/ each

392 ,, Anthraquinone, complete ... ... each £0 6 6

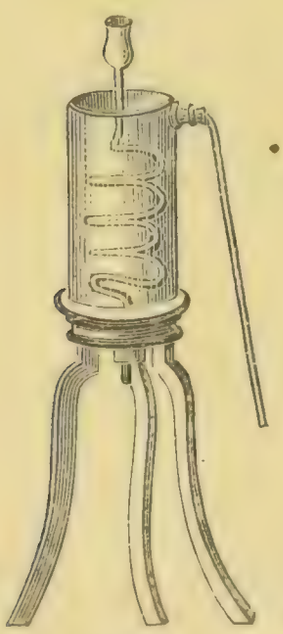
393 ,, Glass Spiral Worm, enclosed in outer Glass Tube, for Fractional Distillation. Sizes of outer Tube—

6×1 8×2 $9\times2\frac{1}{2}$ 10×3 in.

2/ 2/6 3/ 4/ each

393A ,, Glass Spiral, outer vessel 12 in. × 6 in., with Inlet and Outlet Tubes at side ... ... each 0 10 0

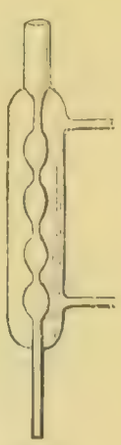
393B ,, Fractional Distillation ... ... ,, 0 12 0



394



395



396



395A



397

394 **Condensers**, Glass Worm, diameter of worm $2\frac{1}{2}$ in., outer glass vessel diameter 5 in., height 9 in., on Wooden Tripod Support, complete £0 12 6

395 **Condensers**, for Fractional Distillation—

Length of Body	10	12	16 in.
	2/	2/6	3/ each

396 ,, Allihn's 3/ 3/6 4/ each

395A ,, Glass, Flat Inner Tube for rapid condensation—

Length of Body	8	10	12 in.
	2/	2/3	3/ each

397 ,, for Liquids at High Temperature—

2	4	6	8 oz.
1/9	2/	2/6	3/6 each

398 **Corks**, finest quality, picked for Chemical purposes—

Diam. $\frac{1}{2}$ to $\frac{5}{8}$ in., for Combustion Tubes, &c., per gross	£0	4	0
,, $\frac{3}{4}$ to $\frac{7}{8}$ in., for Flasks, &c. ... ,,	0	7	0
,, 1 to $1\frac{1}{4}$ in., for Apparatus, &c. ... ,,	0	10	0

398A ,, Good quality, for Chemical purposes—

Diam. $\frac{3}{8}$ to $\frac{1}{2}$ in. ... ... per gross	0	2	0
,, $\frac{1}{2}$ to $\frac{5}{8}$ in. ... ... ,,	0	3	0
,, $\frac{3}{4}$ to $\frac{7}{8}$ in. ... ... ,,	0	5	0
,, 1 to $1\frac{1}{4}$ in. ... ... ,,	0	8	6

399 ,, Bungs, best white, for Bottles and Jars—

Diam.	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	4 in.
Per doz.	3d.	3d.	4d.	4d.	4d.	6d.	7d.	8d.	1/3	2/	2/6	3/	4/	5/	6/	6/6	7/



400

400 **Corks**, Caoutchouc, best quality, solid or with one or two holes.

Diameter Small End—

$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{5}{8}$	in.
3d.	3d.	3d.	4d.	4½d.	5d.	6d.	7d.	8d.	9d.	10d.	1/	1/6	1/10	2/9	3/6	each
2/6	2/8	2/10	3/6	4/	4/9	5/6	6/9	7/9	8/6	9/6	11/6	16/	20/			per doz.

Quantities less than 1 doz. are charged at single price.



401



402

401 **Cork Borers**, best make—

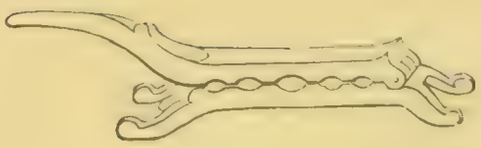
Sets of 2	3	4	6	9	12	
10d.	1/2	1/6	2/3	4/	5/6	per set

402 ,, Best make, Nickel Plated, with separate Handle to each Borer—

Sets of 3	4	6	9	12	
1/8	2/6	3/6	5/6	7/6	per set

403 ,, All Steel Tube, with separate Handle to each Borer—

Sets of 3	4	6	9	12	
3	4/	5/	9/	12/6	per set



405



407

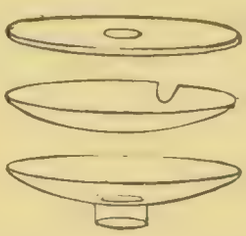
405 **Cork Pressers**, Bronzed Iron ... ... each £0 1 9

406 ,, ,, Large size .. ... ,, 0 2 6

407 **Cork Borer Sharpener** ... ... ,, 0 2 6



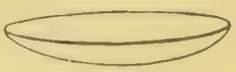
408



409

410

411



412

408 **Covers** for Beakers, Gas Jars, &c., ground on one side—
(Glass Circles or Plates.)

$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	7	8	9 in. diam.
7d.	8d.	11d.	1/	1/3	1/6	2/3	3/	4/	6/ per doz.

409 ,, Flat Ground Glass, for Beakers, with hole in centre for Stirring Rod—

3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5 in. diam.
3/	4/	4/6	5	5/6 per doz.

410 ,, Concave do., with slit at the side—

3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5 in. diam.
5/6	6/	6/6	7/6	8/ per doz.

411 ,, White Glass, with Ground Edge, for Beakers, &c., with Neck in centre to support Funnel—

3	4	5	6 in. diam.
5/	6/	8/	10/ per doz.

412 ,, Concave, for Beakers, &c. (Clock Glasses)—

$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	7	8	9 in. diam.
2/3	2/6	2/9	3/	3/9	4/	5/	6/	7/	8/ per doz.

Covers, Concave, White Glass, thin, with Ground Edge.

See Watch Glasses.

CRUCIBLES, PORCELAIN.



413 414 415 416 417 419

413 **Crucibles**, Berlin Porcelain, with Cover—

Nos.	000	00	0	1	2	3	4	5	
Capacity	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{4}$	$1\frac{1}{2}$	2	$4\frac{1}{2}$	8	oz.
Diam.	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{5}{8}$	$3\frac{1}{4}$	$3\frac{3}{8}$	in.
	3d.	4d.	6d.	8d.	10d.	1/	1/2	1/4	each
	2/9	3/9	5/6	7/6	9/6	11/6	13/6	15/6	per doz.

414 ,, Meissen (Dresden) Porcelain, with Covers—

Nos.	9	8	7	6	5	4	3	2	1	
Capacity	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$2\frac{1}{2}$	$3\frac{1}{2}$	5	8	oz.
	4d.	4d.	5d.	6d.	7d.	8d.	10d.	1/	1/3	each
	3/6	3/9	4/6	5/6	6/6	7/6	9/6	11/6	14/6	per doz.

415 ,, Berlin Biscuit Porcelain, with Cover—
Capacity $1\frac{1}{2}$ oz., 7d. 2 oz., 8d. each

416 ,, Berlin Biscuit Porcelain, no Cover, for Nitrate Silver. Capacity 20 oz. ... ... each £0 1 3

416A ,, (Beakers), Glazed inside and out—

$3\frac{3}{4}$	$4\frac{3}{4}$	in. high
1/6	2/	each

417 ,, Royal Berlin Biscuit Porcelain, with Cover and Leading Tube (Rose's) ... ... each 0 1 0
Crucible and Cover, 6d.; Tube with Flange, 3/6

418 ,, German Porcelain, Cover and Tube ... complete 0 2 6

419 ,, Berlin Porcelain, Cylindrical form, with Cover—
Capacity $\frac{1}{2}$ oz., 7d. $1\frac{1}{2}$ oz., 9d. each



420 422 423 424

420 **Crucibles**, Assay, English Fine Clay, for Gold Assay, &c.—

$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	2 in. high
$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$ in. diam.
2/6	2/6	2/6	2/6 per doz.

421 **Crucibles**, Assay, French Clay, for Gold Assay, same form as Fig. 420—

$1\frac{1}{4}$ in. high, 3/3. $1\frac{1}{2}$ in. high, 4/ per doz.

422 ,, **London Round Fire Clay**—

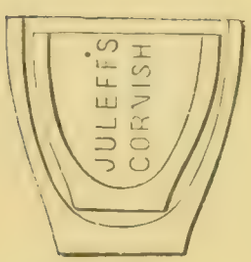
Nos.	1	2	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	8	9	10	
Height	$2\frac{3}{4}$	3	$3\frac{1}{2}$	$3\frac{3}{4}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	8	9	10	in.
Per doz.	8d.	10d.	1/2	1/6	1/9	2/4	3/	3/6	4/	6/	7/	9/	12/6	18/	

423 **Crucible Covers**, London Clay, for the above. Dome Form—

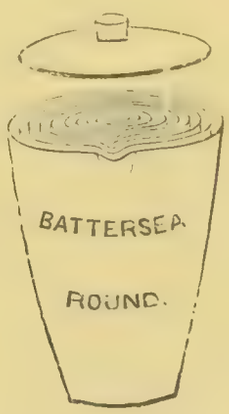
Sizes to fit Nos.	1	2	3 & $3\frac{1}{2}$	4 & $4\frac{1}{2}$	5 & $5\frac{1}{2}$	6	7	8	9	10	
	1/3	2/	2/6	3/	4/	4/6	5/	5/6	6/	7/	per doz.

424 **Crucible Covers.** Flat Form—

Sizes to fit Nos.	1 & 2	3	$3\frac{1}{2}$ & 4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6 & $6\frac{1}{2}$	7 & 8	9	10	
	8d.	1/	1/3	1/6	1/9	2/	2/6	3/	4/	4/6	per doz.



425



426



427

425 **Crucibles**, Cornish shape, Metallurgists', for Copper, &c.—

Height	2	3	4	5	6	7 in.
	10d.	1/2	1/9	3/	4/6	7/ per doz.

Nests of 4, largest 4 in. high, 5/4 per doz. nests.
,, 5 ,, 5 ,, 7/6 ,,

426 **Battersea Round Clay Crucibles**—

No.	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	
	$2\frac{5}{8}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{5}{8}$	$5\frac{7}{8}$	$6\frac{5}{8}$	$7\frac{1}{4}$	8	$8\frac{1}{2}$	$9\frac{3}{8}$	10	11	12	13	in. high
	$1\frac{5}{8}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{7}{8}$	3	$3\frac{3}{8}$	$3\frac{3}{4}$	$4\frac{3}{4}$	$4\frac{3}{4}$	$5\frac{1}{4}$	$5\frac{3}{4}$	$6\frac{1}{2}$	7	$7\frac{3}{4}$	$8\frac{3}{8}$	$9\frac{3}{8}$	in. diam.
	6d.	7d.	10d.	1/	1/6	1/8	2/3	2/4	3/6	3/6	6/	7/3	10/	15/	17/	20/	27/	per doz.
	5/9	6/9	9/6	11/	17/	18/6	26/	27/	39/	41/	70/	84/	115/	175/	200/	220/	310/	per gross

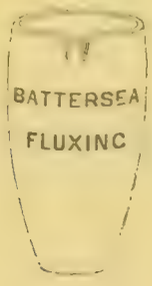
427 **Patented Salamander Crucibles** are not affected by Moisture or Frost, and require no annealing. Each number contains about 2 lb. (English) of metal—

Nos.	1	2	3	4	5	6	8	10	12	16	20	
Height	2⅞	3¾	4¼	4¾	5½	5¾	6¼	7⅛	7¼	8	9	in.
	4d.	8d.	1/	1/3	1/8	2/	2/6	3/	3/9	5/	6/	each
	3/9	7/6	11/	14/	18/	22/	28/	34/	42/	60/	70/	per doz.

Salamander Covers, 1½d. per number each.



428



429



430



434

428 **Crucibles**, Battersea, Triangular—

Height	2	2½	3½	4½	in.
	7d.	10d.	1/2	2/6	per doz.

Nests of 4, above sizes, per dozen nests 5/.

429 **Fluxing Pots**, Battersea Fine Clay, similar to French—

Nos.	0	1	2	3	4	5	6	7	8	9	10	12	
Height	2	2½	2⅝	2¾	3⅛	3½	3⅞	4¼	4¾	5½	5⅞	7¼	in.
Diam.	1½	1¼	1½	1⅝	1¾	2	2⅛	2½	2⅝	2⅞	3⅛	3¾	in.
	6d.	8d.	10d.	1/	1/3	1/6	1/8	2/	2/6	3/	3/6	6/	per doz.

430 **Crucibles, Patent Plumbago.** Superseded by Salamander, and same price.

431 .. Covers for ditto, 1½d. per number.

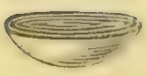
432 .. Stands to support Crucibles, 1½d. per number.

433 .. Clay Stirrers, from 7 to 10 in. long, per doz. ... £0 10 0

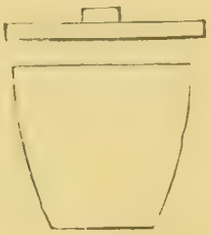
434 .. Clay (Skittle Pots)—

Height	3	4	5	6	8	10	12	in.
	1/9	2/3	3/	3/6	5/	8/6	15/	per doz.


435

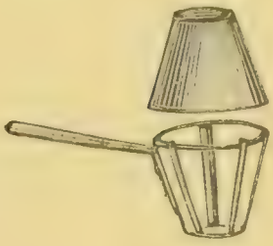

436


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446

435 **Clay Scorifiers**—

Diam.	1¼	1½	2 & 2¼	2½	2¾	3	3½ in.
	5/6	6/	6/6	7/6	9/	11/3	13/6 per gross

436 ,, **Roasting Dishes**—

Diam.	2½	3	4	5 in.
	1/6	1/9	2/3	2/6 per doz.

437 **Crucibles**, Iron—

Height 3 in., 10d. 4 in., 1/. 5 in., 1/6 each.

438 ,, Iron, with Cover—

Height 2 in., 8d. 2¼ in., 10d. 3 in., 1/3 each.

439 ,, Iron. Nest of 3, with Covers as above, per nest £0 2 6

440 ,, ,, Wrought—

4	7 in.
5/6	6/6 each

441 ,, Stout Sheet Iron, with Covers—

Height	2⅛	2⅜	2¾	3¼ in.
Diam.	3	3½	4⅛	4¾ in.
	1/8	1/10	2/	2/6 each

441A ,, Copper, with Cover—

Height	2	2¼	2½ in
Diam.	2¼	2¾	3⅛ in.
	2/	2/6	3/6 each

442 ,, Platinum, as Figs. 442 or 446, capacity 1 oz., being about 1 oz. weight (varies) ... ... per oz. £2 10 0

443 **Crucibles**, Pure Silver ... ... per oz. £0 12 0
444 „ „ Gold ... ... „ 5 10 0
445 „ Jackets, Sheet Iron to protect Crucibles over Lamp, per pair 1/2 and 0 1 6
446 „ Nickel, polished, with Cover—

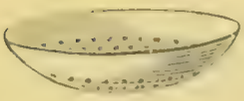
Diam. at top	1⅜	1⅝	2	2⅜	3⅛	4 in.
	1/6	1/9	2/	2/9	3/9	5/6 each

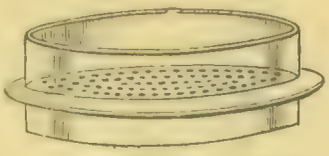
Crucible Tongs. *See "Tongs."*

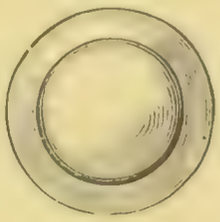


447


448


449


449A


449B

447 **Crucible Jackets, Salamander**, to protect Crucibles over Lamp ... ... per pair £0 2 6
448 **Crystal Drainers**, Berlin Porcelain, with Handles—

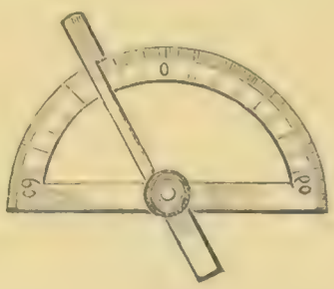
Diam.-	5½	6⅝	8	10¼	12	13¼ in.
	1/6	2/	3/	5/3	7/6	10/6 each

449 „ „ Meissen Porcelain, without Handles—

Diam.	5	11	12	13½ in.
	1/6	6/	8/	11/ each

449A „ „ Porcelain ... ... each 0 6 6
449B „ „ Porous Plates, about 9 in. diam. per doz. 0 2 0


450


451

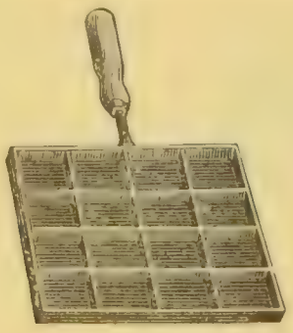
450 **Crystals**, Glass Models of, Cut and Polished to illustrate the 6 Systems of Crystallization, in strong Cardboard Case with divisions £1 12 0
450A „ containing 60 Models, in Polished Mahogany Case 4 10 0
450B „ Models in Wood, Collection of 123 ... ... 4 0 0
450C „ „ in Brass Wire, on Polished Stand, for demonstrating the crossing of axis in 6 different systems 1 7 6
451 **Goniometer**, for measuring the Angles of Crystals 0 7 6



452



453



454

452 **Cupels,** Best French Bone Ash—

Nos. ...	1	2	3	4	5	6	7	8	9	10	
Diameter	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{7}{8}$	$2\frac{1}{4}$	inches
	8d.	9d.	9d.	10d.	1/	1/6	2/6	4/6	8/	15/	per doz.
	5/	5/6	6/	7/	8/	13/	19/	35/	60/	100/	per 100

Boxes containing from 50 to 500, according to size, packed in Cotton Wool, &c., 2/6 to 3/ extra.

453 **Cupel Moulds,** Polished Steel, in 3 pieces—

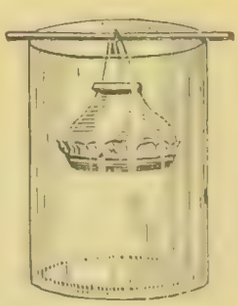
Diameter	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{1}{4}$ inches
	6/6	7/	8/	9/	10/6	12/	14/	15/	16/6	19/	20/6 each

453A **Cupel Moulds,** Cast Iron, in 3 pieces—

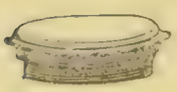
Diameter	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$ inches
	5/	5/3	5/6	6/6	7/	8/	9/	10/6	12/ each

With False Bottoms, 1/ each extra.

454 **Cupel Trays,** Sheet Iron, with 16 divisions £0 4 0



458



455



457

459

455 **Dialysers,** Graham's, consisting of Gutta Percha Rings and three pieces of Dialysis Paper to fit—

Diameter of Rings	6	8	10	12 inches
	2/	3/	4/	5/ each

456 **Dialysis Paper,** 20 in. × 20 in., best quality, per sheet ... £0 0 3

$8\frac{1}{2}$	$10\frac{1}{2}$	$12\frac{1}{2}$	$14\frac{1}{2}$ inches square
1/	1/6	2/	2/6 per doz. sheets

457 **Glass Basins,** flat conical, with Spout, suitable for the above—

Diameter	9	11	13	15 inches
	2/	3/	3/6	5/ each

458 **Dialyser,** Bell shaped, Glass, with 2 Flanges—

	3	4	5 in. bore
	8d.	10d.	1/ each

Parchment Papers for the above, 8d., 9d., and 1/ per doz.

459 **Cylindrical Jars,** without feet, for above—

	6 × 4	8 × 5	9½ × 6¼
	10d.	1/6	2/

460 **Diamonds,** for writing on glass ... each 7/6, 10/6, 12/6 and £0 15 0

460A ,, for burning by electricity ... ... from 4/6 each

461 ,, Glaziers', for cutting glass ... ... each 17/6 and 1 1 0

461A **Pencils (Blue or Yellow),** for writing on glass, per doz. 5/ ; each 0 0 6



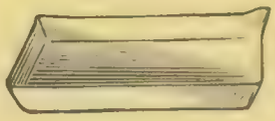
462



463



464



465

462 **Digesters,** Berlin Porcelain—50 c.c. capacity, 10d. ; 90 c.c., 1/ each

463 ,, Berlin Porcelain, with Porcelain Handle and Cover—

Capacity	300	600	1000 c.c.
	3/9	4/6	6/ each

464 **Cast Iron Digester,** enamelled inside, capacity about ½ pint... £1 0 0

465 **Dishes,** Porcelain, Flat Photographic, with Lips, depth about 1 in.—

Diameter at Bottom—		Diameter at Bottom—	
5 by 4 in. (¼ plate) ...	each /8	12 by 10 in.	each 2/3
6 ,, 5 ,, ...	,, /9	13 ,, 11 ,, ...	,, 3/
7 ,, 5 ,, (½ plate) ...	,, /9	14 ,, 11 ,, ...	,, 3/9
8 ,, 6 ,, ...	,, /11	16 ,, 12 ,, ...	,, 5/6
9 ,, 7 ,, (¾ plate) ...	,, 1/1	18 ,, 16 ,, ...	,, 9/
10 ,, 8 ,, ...	,, 1/4	20 ,, 17 ,, ...	,, 14/
11 ,, 9 ,, ...	,, 1/8	24 ,, 19 ,, ...	,, 20/
		24 ,, 22 ,, ...	,, 28/

465A **Dishes** (Photographic), Deep Porcelain—

5 × 4	7 × 5	8 × 6	10 × 8	12 × 10	14 × 12	
9d.	1/	1/2	1/8	2/6	4/6	each

465B ,, (Photographic), Enamelled Iron—

5¼ × 4¼	6¾ × 5	7¾ × 5¼	8¾ × 6¾	10½ × 8½	12½ × 10½	
1/3	1/6	1/9	2/	2/9	3/	each

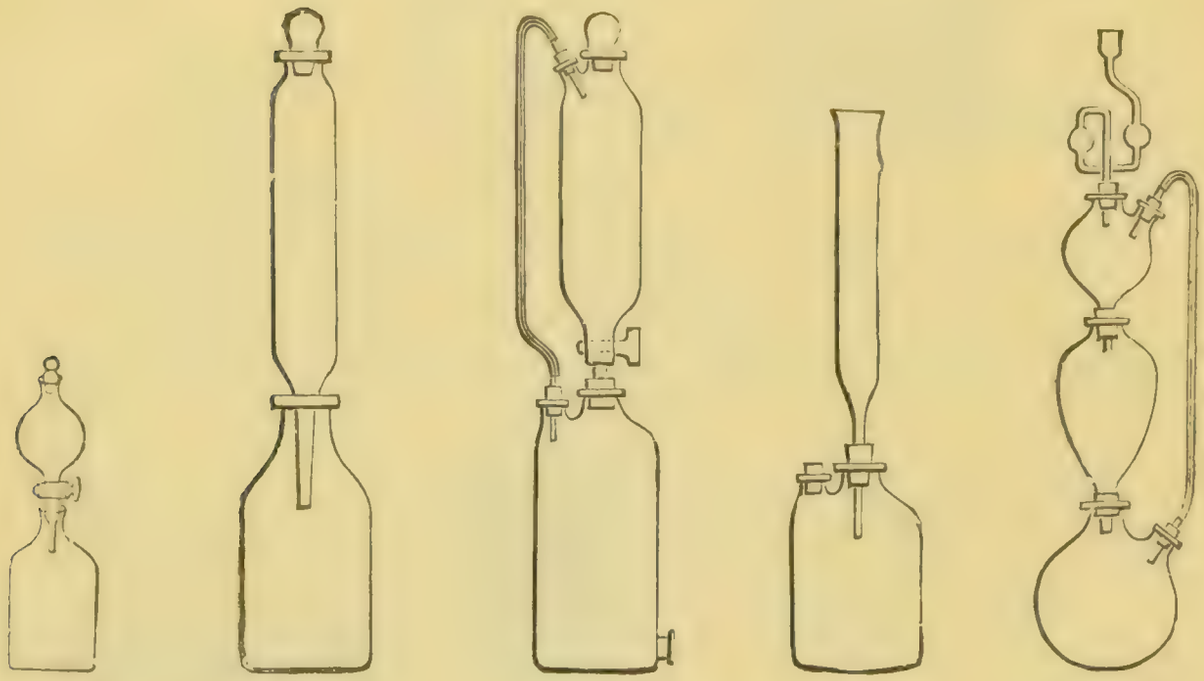
465C ,, (Photographic), Glass—

5 × 4	8½ × 6½	10 × 8	12 × 10	
1/8	3/6	4/3	8/6	each

465E ,, (Photographic), Xylonite, Chocolate Colour—

5 × 4	7½ × 5	10¼ × 8¼	
9d.	1/3	2/	each

DISPLACEMENT APPARATUS, PERCOLATORS, &c.



466 467 468 469 470

466 **Percolator,** with Glass Stopcock, Bulb ground to neck of Flask—
Capacity of Flask 8 ozs., 3/6. 16 ozs., 5/ each.

467 ,, Cylindrical, with hole through Funnel and neck of Flask for admission of external air, best German Glass—

1	1½	2 pints
4/6	5/6	7/ each

468 ,, for Ether and Alcohol Extractions, upper Cylinder with Stopper, and Stopcock fitted to lower vessel with cork, white glass, complete with fittings, and Stopcock for lower vessel—

Upper Cylinder	1 pint,	lower vessel	2 pints	£0 10	0
,,	2 ,,	,,	4 ,,	0 12	0
,,	3 ,,	,,	6 ,,	1 8	0
,,	4 ,,	,,	8 ,,	1 12	0

469 ,, for small quantities, Cylinder fitted with cork to stout bottle with two necks, Cylinder about 6 in. by ¾ in., lower vessel 5 oz. capacity, complete 0 2 0

470 ,, Regnauld's, for Extractions of Alcohol or Ether, thin glass, the bulb to be placed in Water Bath, capacity of lower bulb about 6 ozs. ... 0 4 0

,, ,, ,, ,, 12 ,, ... 0 5 0



471 472 473 474

471 **Displacement Apparatus,** White Glass, with Bulb and Stopper—

250	500	1000 c.c. Capacity of lower Vessel
2/3	3/	4/ each

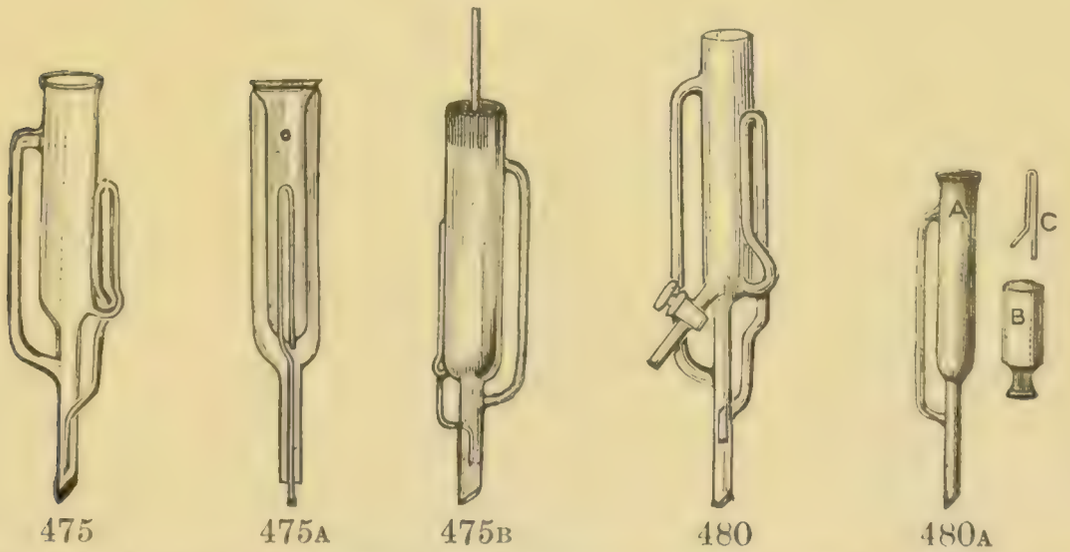
472 2/9 3/6 4/6 ,, with Tubulure at side

473 ,, Bohemian Glass, with Angular Funnel—

1	2	4 litres Capacity of lower Vessel
6/	7/6	8/ each

474 ,, Bohemian Glass, with stout ground Glass Cover—

1	2	4 litres Capacity of lower Vessel
11/	12/6	15/ each



475 475A 475B 480 480A

475 **Soxhlet's Fat Extraction Apparatus,** as used in Dr. Skalweit's Laboratory, Hanover—

Capacity 60	80	100	200 c.c.
3/	3/6	4/	5/6 each

475A **Blount's Soxhlet's Fat Extraction Apparatus** £0 4 0

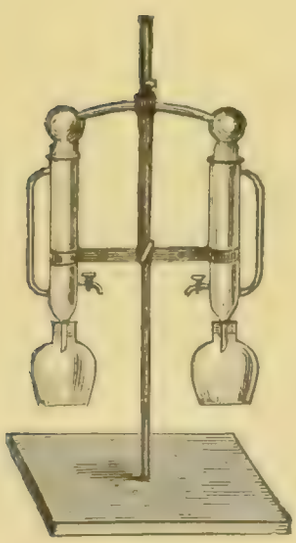
475B **Soxhlet's Fat Extraction Apparatus,** with Tubulure and Stopper at top accurately ground 0 5 6

480 **Soxhlet's Fat Extraction Apparatus,** with Stopcock—

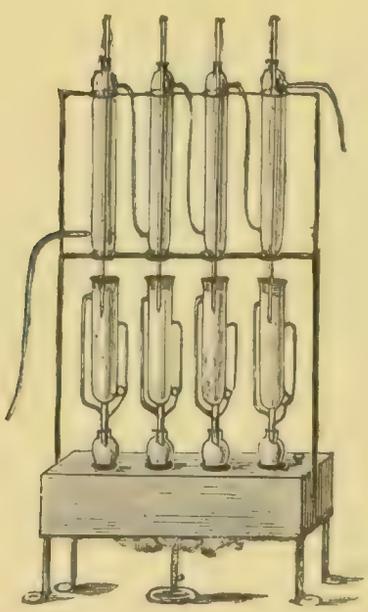
Capacity 60	80	100	200 c.c.
5/6	6/	6/6	8/ each

480A **Greiner & Friedrich's Extraction Apparatus,** consists of 3 parts, viz., the Outer Tube *A*, the Filter Tube *B*, and the Syphon Tube *C*. The Filter Tube shows a contraction (which can be easily closed by means of a stopper) and a channel at the side. Tubes *A* and *B* can already be used as a common Extraction Apparatus, when the substance to be extracted is placed into Tube *B* after having been secured in a filter paper. In this case the narrow part of the Filter Tube is left open. When substances are to be extracted which must remain under liquid for some time the Syphon Tube *C* can be employed with advantage. For this purpose the narrow part of the Filter Tube must be closed by a stopper, after which the Syphon Tube is placed with the straight part in the channel with the bent part into the interior of the Filter Tube, so that the end is touching the lowest point of the contraction. The substance to be extracted surrounded by a Filter is brought into the Filter Tube which must now be pushed into the Outer Tube *A*. Attention must be paid that the Syphon Tube should not be displaced, if so, it can be easily put in the right position by means of a stirrer. The Apparatus can now be attached to the Extraction Flask and the Condenser and the Water Bath brought in action. The condensed fume of the extracting liquid will now drop into the Filter Tube decocting the substance. Before the liquid reaches the edge of the Filter Tube the Syphon Tube will begin to act (in consequence of its capillary attraction) lifting out the contents. This action will continue so long as the Water Bath is applied. This Apparatus is very simple and can be easily managed and cleaned. The great advantage of the same is that the Syphon Tube is separate and can be easily changed or replaced when broken or stopped—

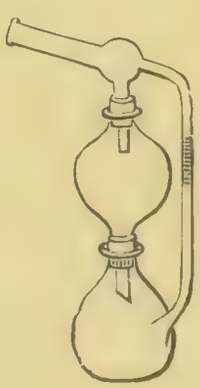
Contents of Filter Tube	60	100	200 c.c.
	3/6	4/6	6/ each



475C



475D



476

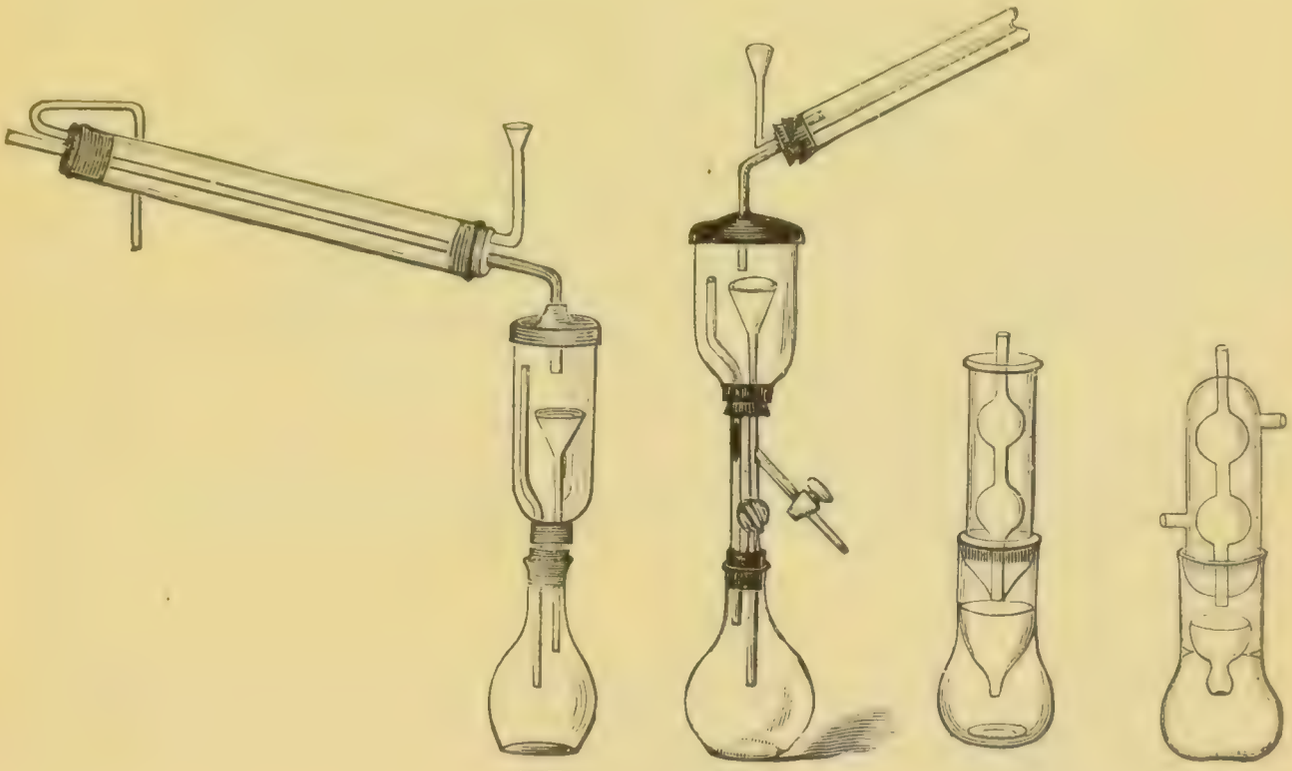
475C **Yardley's Fat Extraction Apparatus,** with Stoppered Condensing or Connecting Tube, accurately ground in to the top of both Cylinders... ... ... £0 16 0

Stand with Clamps, for above 0 7 6

475D **Iron Stand with Copper Water Bath,** arranged for a series of Butter or Fat Extractions, the four (or more if required) inner and outer Tubes of the Condensers are connected with India Rubber Tube; the Copper Water Oven is supplied with India Rubber Rings for the support of the flasks, also with covers, so that one or more can be in use. The Stand is made so as to screw on to bench; the upper rings are moveable. Size of Copper Oven 18 × 6 × 4 in. Height of Stand 40 in. Price for Stand and Copper Oven £2 10 0

476 **Drechsel's Fat Extraction Apparatus—**

100	250	500	1000 c.c.
2/	2/6	3/	4/ each



477 478 479 479A

477 **Angell's Fat Extraction Apparatus,** for Analysis of Butter, Milk, &c. ... ... complete £0 12 6

478 ,, **Improved Fat Extractor,** arranged by Mr. Angell, County Analyst, Southampton. In order to condense all Vapour it is necessary to have a Condenser at least 5 feet long. Price without Condenser 1 1 0

Glass Condenser only 0 10 0

479 **Thorn's Apparatus,** for estimation of quantity of Oil in Seeds, &c. 0 8 0

479A ,, Ditto ditto 0 9 0



481 482 483 484 485

481 **Tollen's Fat Extraction Apparatus** £0 2 0

482 **Kreussler's** ditto, with 3 Inner Tubes and Stoppered Flask ... 0 9 0

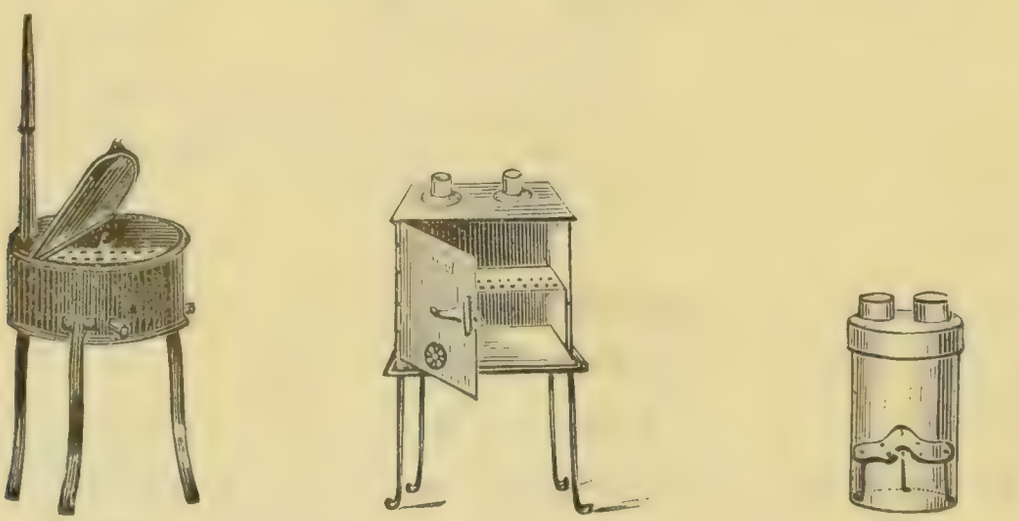
483 **Schwarz's** ditto—

Capacity	100	250	500	1000 c.c.
	5/6	6/	7/	8/ each

484 **Gawalowsky's** ditto 0 9 0

485 Ditto ditto, Drechsel's form 0 11 0

DRYING APPARATUS BY HOT AIR.



486 488 489

486 **Taylor's** Japanned Tin Circular Drying Oven on Legs.
Diameter of Body, 9 in., Height, 4 in. ... ... each £0 9 0

487 Ditto ditto, same size, Copper 1 10 0

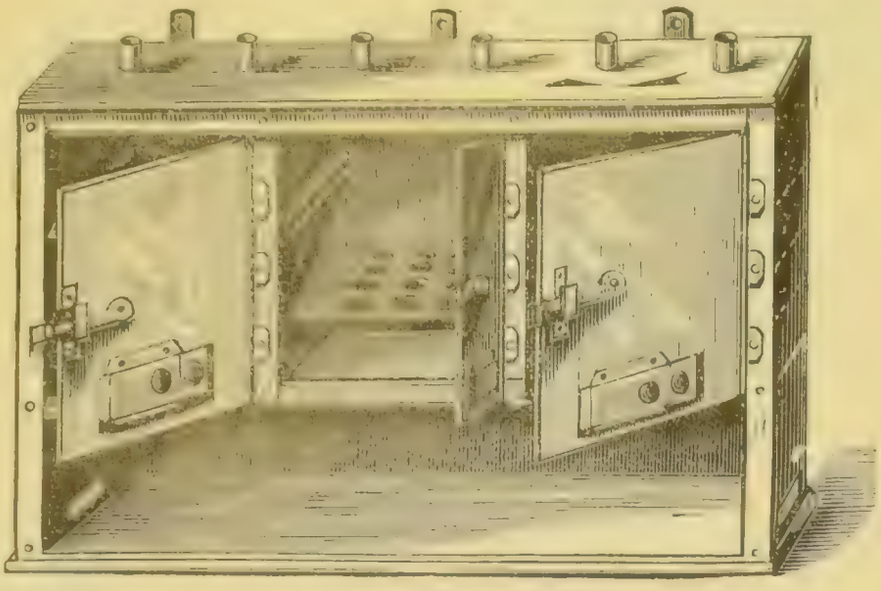
488 **Drying Oven,** Square, Stout Copper—
Size, front 6½ in., front to back 6½ in., height 5 in., each 0 15 0
,, 7½ in. ,, 7½ in. ,, 6 in. ,, 0 18 0
,, 9 in. ,, 9 in. ,, 9 in. ,, 1 5 0
Wrought Iron Stands Extra (*See Stands*).

488A **Drying Oven,** Sheet Iron, as Fig. 488, with Feet—

Size, front 6½ in.,	front to back 6½ in.,	height 5 in.,	each	£0	11	6
,, 7½ in.,	,, 7½ in.,	,, 6 in.,	,,	0	13	6
,, 9 in.,	,, 9 in.,	,, 9 in.,	,,	0	16	6

489 **Rammelsberg's** Copper Drying Bath, Brazed

Height 6 in., Diameter 4 in. ... ... each 0 7 6



490

490 **Drying Oven,** Copper, length 21½ in., front to back 7½ in., height 9 in., in three Compartments, with Shelves perforated for Crucibles, &c., on Sheet Iron Stand, total height 15½ in. £2 10 0

DRYING APPARATUS BY HOT WATER.



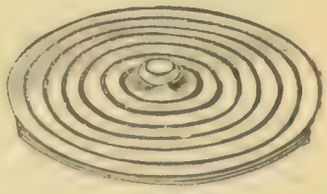
491



494



498



500



501

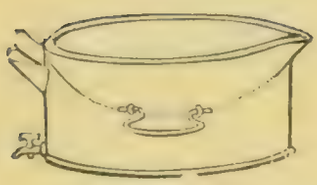
491 **Water Bath,** Berlin Porcelain—

Capacity, inner pan, 3 oz. ...	...	...	...	each	£0	3	0
,, ,, 1½ ,, ...	...	...	...	,,	0	3	6
,, ,, 6 ,, ...	...	...	...	,,	0	5	6

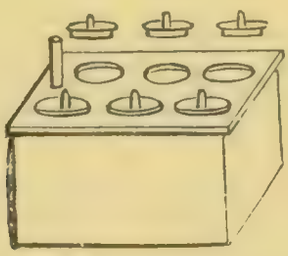
493 ,, English Stoneware. Capacity, inner pan, 4 oz. ,, 0 1 0

494 **Water Bath**, Copper, with 4 Rings for Basins—

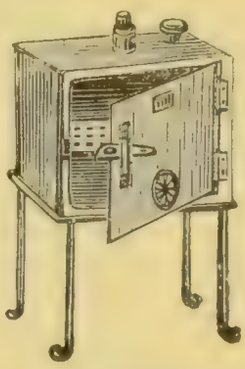
	Diameter, outer pan, 5 in. ... ... each	£0	6	0
	,, ,, 6 ,, ... ,,	0	8	6
	,, ,, 8 ,, ... ,,	0	12	6
495	,, ,, ,, 9 ,, 5 Rings ... ... ,,	0	15	0
496	,, Deep Capacity, 2 galls., 6 Rings and Gauge ... ,,	2	10	0
497	,, Japanned Tin, Taylor's form, round, with legs, as Fig. 486 ... ... each	0	16	0
498	,, Copper, on legs, with 3 holes for Basins, Funnel Holder, Drying Drawer and Covers, 12 in. by 9½ in. by 4 in. deep ... ... each	1	10	0
499	,, Ditto, ditto, with 4 holes ... ... ,,	1	15	0
	Can be made in any size with 1 or more holes, &c.			
500	,, Set Porcelain Rings, 7½ in. diam. outside, to 1⅜ in. inside, with Cover (Glazed) ... ... per set	0	2	6
501	,, Tin Plate (Graham's) ... ... each	0	0	6



502



503-5



505

502 **Water Bath**, Tin Jacket, with Porcelain Basin, 12 in. diam., and Brass Stopcock, for concentrated infusions, &c. ... ... each £0 12 6

503 ,, Copper, for Wanklyn's Milk Analysis, for Platinum Capsules, with 3 holes and Covers 0 8 6

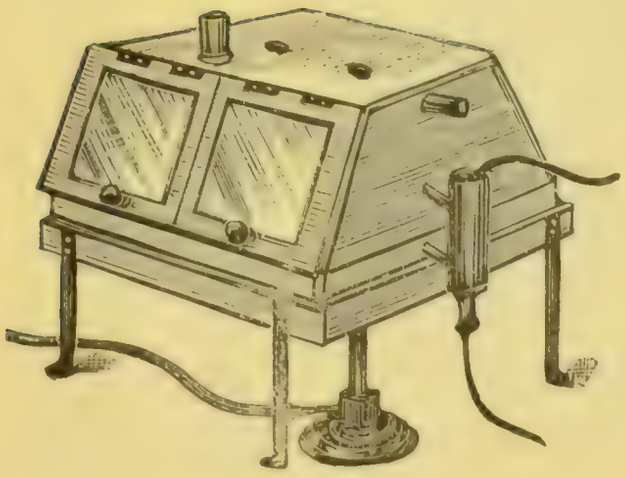
504 ,, Ditto ditto 6 ditto 0 12 0

505 ,, Platinum Capsules, to fit, numbered ... each about 0 18 0

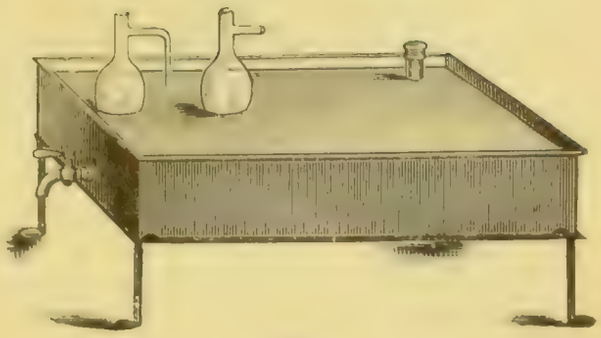
506 **Water Ovens**, Copper, polished, with gauge, best make—

Size, front	5½	6⅛	6⅞	9	14	15½ in.
Front to back	6	6¼	7¾	9	10	12 in.
Height	4½	5¼	6¼	9	10¼	14 in.
	12/6	£1 1/	£1 5/	£1 16/	£2 15/	£3 15/ each

Other sizes or descriptions made to order.



506A

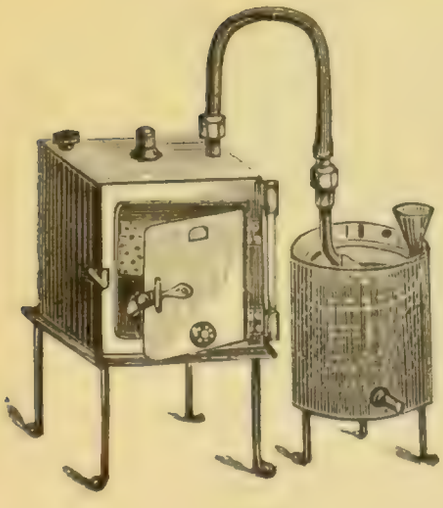


506B

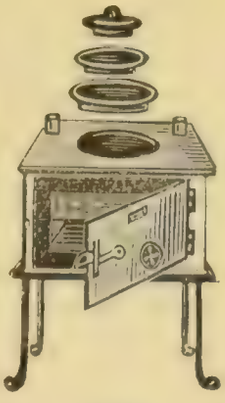
506A **Copper Water Drying Oven**, on Iron Stand, arranged by Prof. Reynolds, Trinity College, Dublin. Size of base 17 in. × 14 in., height to top of Oven 9 in., with four Compartments and Glass Doors on hinges, with Shelves inside for Funnels, &c., and Water Level. Price, without Burner £5 0 0

506B **Copper Forcing Tray**, with Rim, on Iron Stand, for Brewers' use, 18 × 12 × 2½ in., with Draw-off Tap 2 0 0

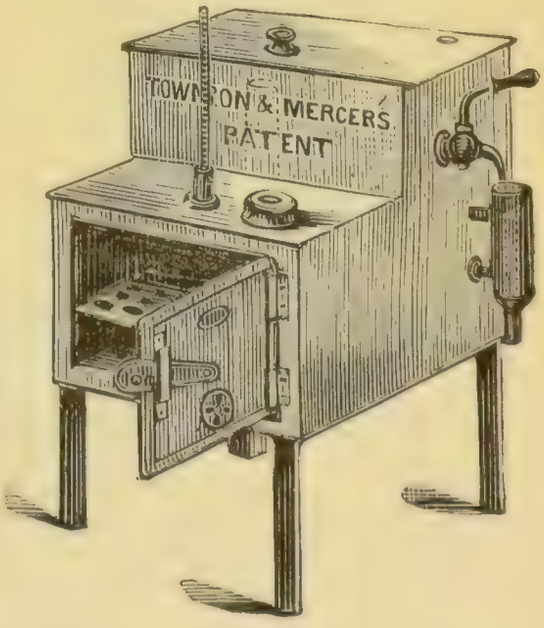
Special Jet Burner for above 0 1 6



507



508



511

507 **Copper Water Drying Oven**, with Water Gauge, Union Joint Connections and pure Tin Worm Condenser, for making Distilled Water, complete with Stand—

Size, front of Oven 9 in.	Front to back 9 in.	Height 9 in.	£3	15	0
,, ,, 14 ,,	,, 10 ,,	,, 10 ,,	4	15	0
,, ,, 15½ ,,	,, 12 ,,	,, 14 ,,	6	0	0

508 **Water Drying Oven**, with three rings for evaporating—

Size, front of Oven 9	in.	Front to back 9	in.	Height 9	in.	£2	7	6
,, ,,	14	,,	,,	10	,,	,,	10	,,	3	10	0
,, ,,	15½	,,	,,	12	,,	,,	14	,,	4	10	0

509 **Drying Ovens**, Copper, for Oil, Brazed, as Fig. 506—

Size, front of Oven 5½	in.	Front to back 6	in.	Height 4¼	in.	1	10	0
,, ,,	6⅛	,,	,,	6¼	,,	,,	5¼	,,	2	3	0
,, ,,	6⅞	,,	,,	7¾	,,	,,	6¼	,,	2	10	0
,, ,,	9	,,	,,	9	,,	,,	9	,,	3	10	0

510 **Stands**, on four Legs, for the above—

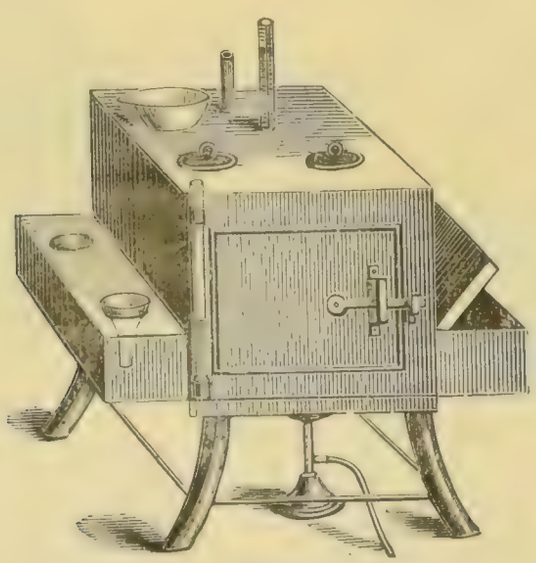
3/ 3/6 4/6 5/ 7/6 each

511 **Copper Hot Water Oven**, Townson & Mercer's Patented, with Cistern for Automatic Supply of Water without lowering the temperature of the Oven, and obviating the necessity of attention to the water supply for about 16 hours.

Sizes, exclusive of Cistern, best Polished Copper, with Stand—

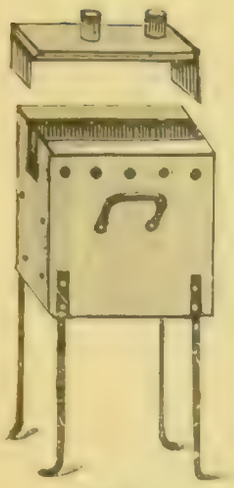
Front	5½	6⅛	6⅞	9	14	15½ in.
Front to back	6	6¼	7¾	9	10	12 in.
Height	4½	5¼	6¼	9	10¼	14 in.
Price	30/	35/	40/	60/	84/	110/ each

Other sizes made to order.

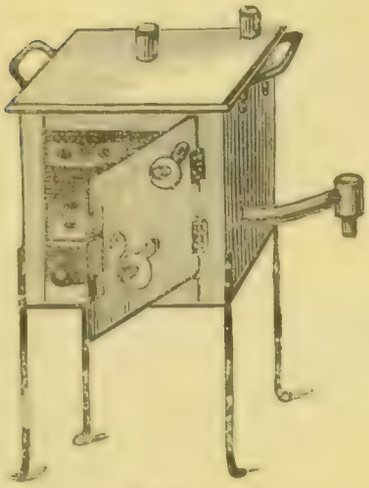


511A

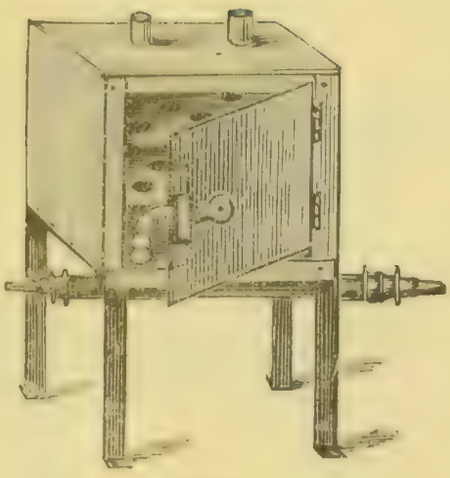
511A **Copper Hot Water Oven**, Wills', consists of Hot Water Bath, Air Chamber 10 × 7 × 8 in. from back to front, two Hot Water Funnels, Hot Air Box for Drying, four openings at top with Covers for Evaporating, and Water Gauge, on stout Iron Stand £4 0 0



517



519



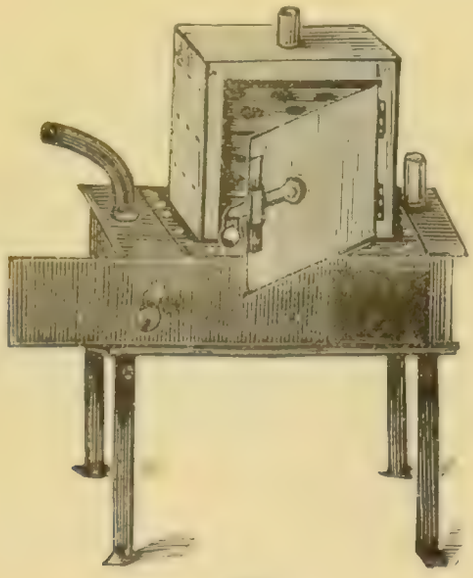
520

517 **Copper Bath**, 5 × 4 × 6 in. high, on Stand, with Moveable Top for Two Tubes £0 15 0

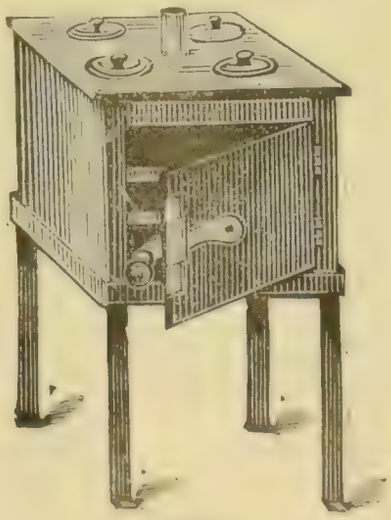
518 Ditto, ditto, with Double Walls 1 0 0

519 **Copper Water Bath**, on Stand, $7\frac{1}{2} \times 7\frac{1}{2} \times 7$ in., with Two Shelves, Five Holes in each, and Water Level Arrangement 1 5 0

520 **Copper Drying Oven**, Dr. Rühdorff's, 10 × 6 × 8 in., with Two Shelves, with Holes of various sizes, on Strong Iron Stand, with S shape Gas Burner and Sliding Arrangement for moving closer or further from Oven ... 1 17 6



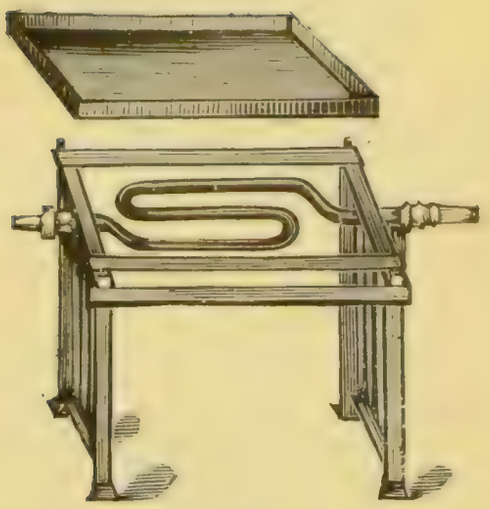
521



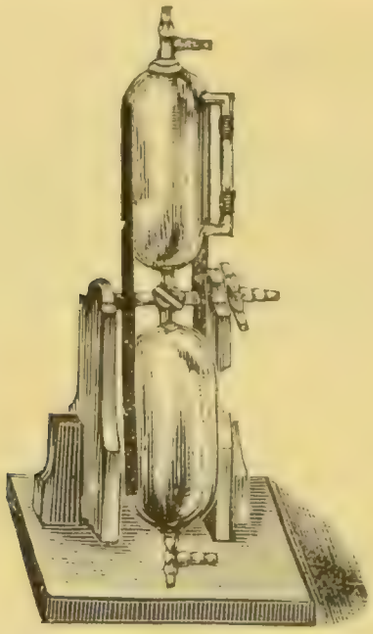
522

521 **Copper Drying Oven**, on Iron Stand, upper portion 6 × $5\frac{1}{2}$ × 5 in., with Shelf, Nine Holes $\frac{3}{4}$ in. diam., the lower part 9 × $5\frac{1}{4}$ × 4 in., Partition in centre and partially Jacketted inside, with Outlet Tubes top and bottom, and Sliding Door £2 0 0

522 **Copper Water Bath**, with Four Holes at top, Three Rings various sizes and Covers to each, outside measure 8 × 8 × 8 in., internal dimensions of Oven $6\frac{3}{4} \times 5\frac{3}{4} \times 5\frac{3}{4}$ in., with Three Tubes $\frac{3}{4}$ in. diam. passing through centre, with Strong Iron Stand 1 15 0



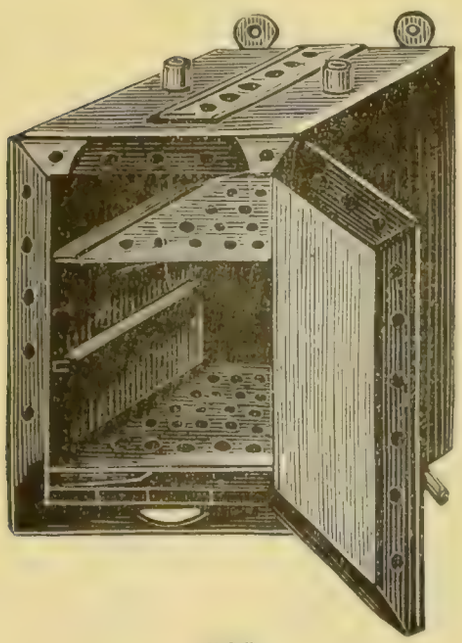
523



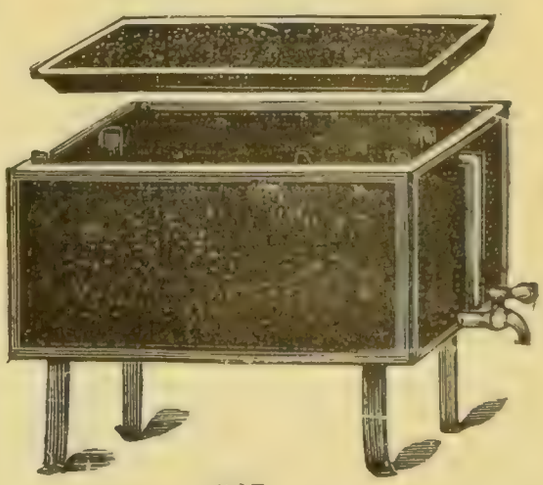
524

523 **Iron Sand Bath**, Rühdorff's, Moveable Tray, 10 × 6 × ¾ in. deep, on strong Iron Stand, with S form Gas Burner, arranged for raising or lowering £0 15 0

524 **Muencke's Aspirator,** Japanned Zinc, about 1 gall. capacity, Brass Polished Fittings, on strong Iron Frame and Wood Stand 3 10 0



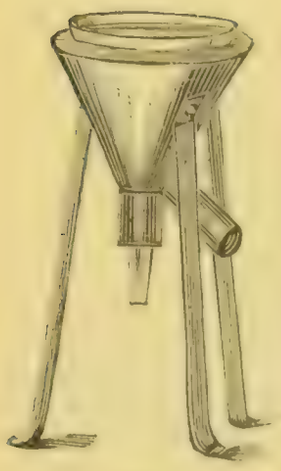
526



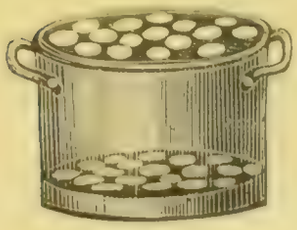
527

526 **Sterilising Oven**, Copper, Double Walls, Inner Chamber 9 × 8 × 11¾ in. high, with Two Shelves perforated, Sliding Ventilator at top, and Two Apertures for Thermometer and Gas Regulator £3 0 0

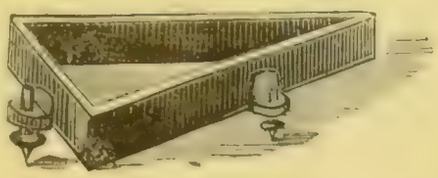
527 **Cultivating Trough**, Sheet Iron, Double Walls, Water Gauge and Stopcock, and strong Glass Cover, Isolated Inner Chamber of strong Sheet Lead, 20 × 10 × 10 in. inside measure, provided with arrangement for equal circulation of Warm Air, the whole covered with thick Felt and fitted with Brass Polished Mounts, with strong Iron Stand 3 10 0



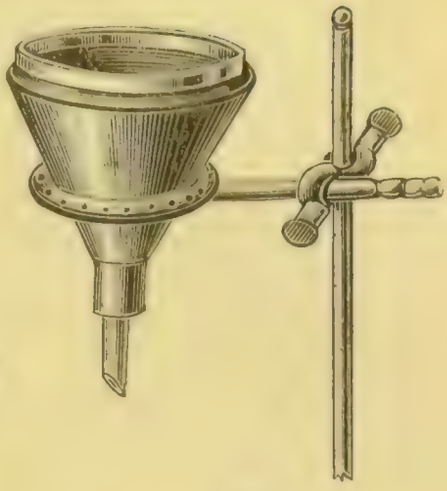
529



528



530



529A

528 **Water Bath,** Stout Copper, for Test Tubes, 6 in. diameter, with Tripod Stand £0 13 6

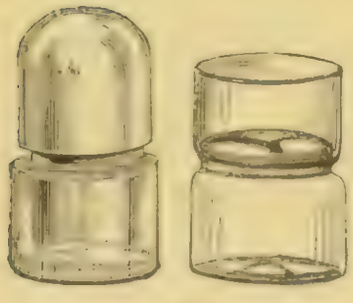
529 **Hot Water Funnel Jacket,** Copper, on Three Legs, with Funnel 4 in. diameter, complete, single jacket 0 7 6

,, ,, ,, ,, double jacket 0 12 0

529A ,, 4 in. diameter, of Brazed Copper, Ring Burner with Stopcock, for fixing on Retort Stand 0 11 6

530 **Tripod Levelling Stand,** Strong Polished Oak and Brass Mounts, outside measure 14½ in., for Levelling Glass Plates, Dishes, &c. 0 6 6

DRYING APPARATUS OR DESICCATORS.



539



539A



540



541



542

539 **Desiccator,** Bohemian Glass, accurately ground, Dome or Flat Top, for Chloride Calcium, Sulphuric Acid, &c. ... each £0 4 6

539A ,, Bohemian Glass, accurately ground, with Knob at Top, ground for writing upon or labelling 0 5 0

540 ,, Ditto, with Stout Ground Glass Cover 0 2 6

541 ,, Accurately ground, with Glass Stopcock 0 6 6

542 ,, Ditto improved, with Stopcock and Glass Hook, according to Professor Schiff—

Internal diameter of Top 4 in. 0 7 0

,, ,, 5 ,, ... 0 9 6

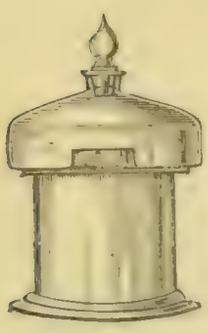
HEMPEL'S NEW DRYING APPARATUS.

The Drying Apparatus, according to the old patterns in which substances have to be dried, have the Sulphuric Acid or other desiccating substances placed beneath, and taking into consideration that moist air is lighter than dry air, it is evident that this is entirely wrong in principle.

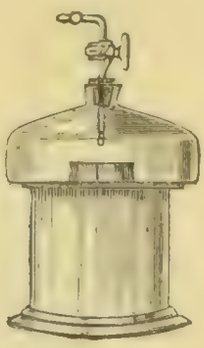
The above sketches show Prof. Hempel's New Apparatus. The substance to be desiccated is placed in the Jar and the Sulphuric Acid into the upper part of the Apparatus.

The moisture rises to the Sulphuric Acid and is absorbed.

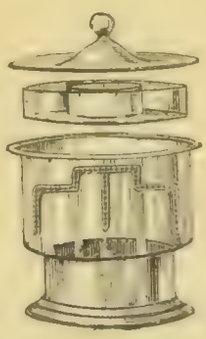
Numerous trials have proved that the drying process is performed in one-third of the time employed with any Desiccator of the old pattern.



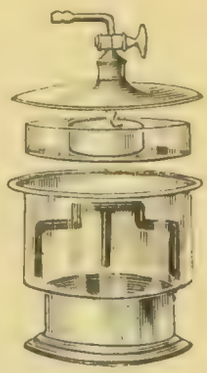
542A



542B



542C



542D

542A With Stopper at Top—

4 in. diameter	...	...	...	...	...	each	£0	4	0
6 „ „	...	...	...	...	...	„	0	6	0

542B With Stopcock—

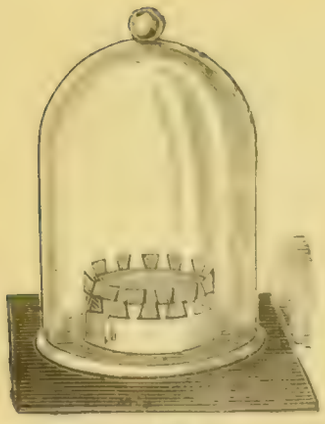
4 in. diameter	...	...	...	...	...	each	0	9	0
6 „ „	...	...	...	...	...	„	0	11	0

542C With separate Dish, Iron Tripod, and Cover with Knob—

Internal diameter of Jar 4 in.	...	...	...	each	0	5	0
„ „ 6 „	...	...	...	„	0	7	0

542D Same as above, with Stopcock—

4 in. diameter	...	...	...	...	...	each	0	9	0
6 „ „	...	...	...	...	...	„	0	12	0



543



545



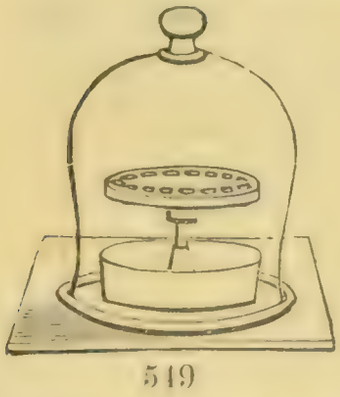
546

543 **Drying Apparatus**, with Bell Glass Cover, Glass Plate and Dish—

Diameter of Cover 5¼ in.	Plate 8½ in. square	...	each	£0	4	6
,, ,, 6½ ,,	,, 10 ,,	,,	...	,,	0	6	0
,, ,, 8 ,,	,, 11 ,,	,,	...	,,	0	8	6

545 ,, With Stand and Porcelain Sulphuric Acid Dish, Diameter of Cover 6½ in ... ... each 0 10 0

546 ,, Erdmann's, with Stout Glass Cover, about 6½ in. Diameter, Glass Dish and Stand complete each 0 8 6



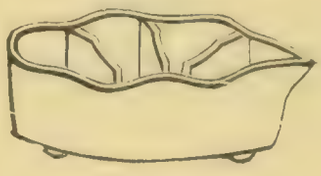
549



549A



550



551

547 **Glass Plates**, ground on one side for Desiccators, ¼ in. thick—

$8\frac{1}{2} \times 8\frac{1}{2}$	10×10	11×11 in.
1/6	2/	2/6 each

548 **Sulphuric Acid Dish**, Porcelain, with Perforated Wooden Table to fit the Pan, for Funnels, Capsules, &c., Diameter of Pan 5 in. £0 2 6

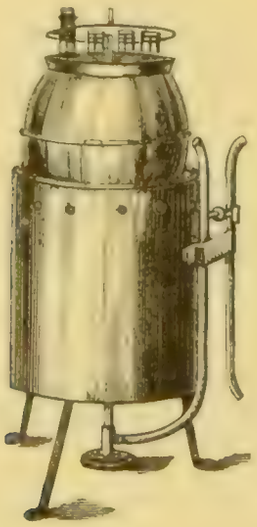
549 ,, with Bell Jar, Ground Glass Plate and Cover, Porcelain Dish, complete 0 7 6

549A ,, Desiccator, small, for Balances—
2 in. diameter ... ... each 0 0 8
3 ,, ,, ... ,, 0 1 0

550 ,, Stoneware Pan, Ivory ware, to contain Sulphuric Acid, Flat Bottom, 6×2 in., 1/; 8×2 in. 0 1 3

551 ,, with Partitions for the support of Capsules, under a Glass Receiver. Dresden Porcelain, 4⅛ in. diameter ... 0 2 0
,, ,, 4⅞ ,, ,, ... 0 2 6

551A ,, German Porcelain ... ... $4\frac{1}{2}$ 5 6 in. diam.
2/ 3/ 4/ each



551B

551B **Dupre's Apparatus for Dynamite** £3 0 0

Electrical Apparatus (*See Special List*).

Eudiometers (*See Graduated Instruments*).

552 **Files**, Round, for Enlarging Holes in Corks—
Per doz. 4/6 and 7/6. Each 5d. and £0 0 8

553 „ Triangular, for Cutting Glass Tube and Rod—
Per doz. 4/6 and 7/6. Each 5d. and 0 0 8

554 „ Flat ... ... Each 9d. and 0 1 3

555 „ Rasps ... ... Each 0 1 0

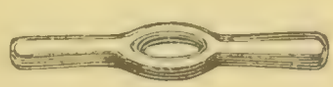
Wood Handles for Small Files, 1d. each extra.



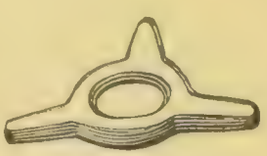
556



557



560



561

556 **Filter Holders**, German Porcelain (Skeleton Funnels)—

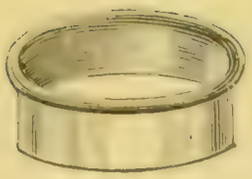
4	$4\frac{3}{4}$	6 in. diam.
8d.	1/	2/ each

557 .. Dresden Porcelain, for quick filtering—

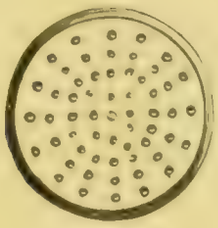
3	4	5 in. diam.
1/	1/8	2/ each

560 **Filter Rings**, Porcelain, 2 arms ... ... each 2d. and £0 0 4

561 „ „ 3 „ ... ... „ 4d. „ 0 0 6



561A

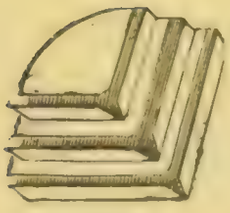


561B

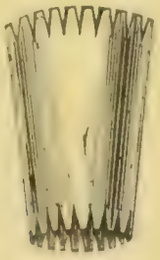


561C

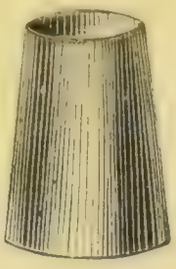
561A **Filter Ring**, Glass. Diam. 3 in. Height 1¼ in. ... each £0 0 6
561B ,, **Plates**, Porcelain, 1½ and 2¼ in. diam., perforated for quick filtering with Glass, Wool, Asbestos, or Filter Paper ... ... each 0 0 6
561C ,, Beale's, for testing small quantities in large solutions ,, 0 0 8



562



563



563A



564

562 **Filter Cutters**, Tin, Triangular ... ... per set £0 0 6
563 ,, **Dryer**, Tin, Conical 0 0 6
563A ,, ,, ,, Graham's, Closed at Bottom 0 0 6
564 ,, **Tube** for Asbestos 0 0 6
564A **Porcelain Cones** for filtering, perforated. Diam, 1¾ in. each 0 0 6
564B **Platinum Cones**, ¾ in. diam., perforated ... ... about 0 6 0

FILTER PAPERS.

565 **Filter Papers**, Coarse, Dutch. Size 24 × 24 in. per quire £0 2 0
,, ,, ,, ,, ,, per ream 1 18 0
565B .. Strong Grey, French, cut Circular, in Packets of 100 each—

6	7½	9½	13	15½	17½	19½ in. diam.
8d.	10d.	1/	1/6	2/	2/3	2/6 per packet

ENGLISH FILTER PAPERS.

566 **Filter Papers**, White. ... Size 22 × 18 in. per quire £0 1 0
,, ,, ,, ... ,, ,, per ream 0 18 0
,, ,, ,, Large ,, 24 × 24 in. per quire 0 1 6
,, ,, ,, ,, ,, ,, per ream 1 5 0

567 **Filter Papers,** White, Best. Size 24 × 24 in. per quire £0 2 0
,, ,, ,, ,, ,, ,, per ream 1 15 0

Cut, in Packets containing 100 each.

$2\frac{3}{4}$	$3\frac{3}{4}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$7\frac{1}{2}$	9	12 in. diam.
3d.	4d.	6d.	8d.	10d.	1/2	1/8 per packet
2/3	3/	4/6	6/	8/	11/	15/ per bundle of 1,000

567A ,, Thin, Grey, for quick filtering ... ... per quire £0 1 6
,, ,, ,, ,, ... per ream 1 7 0

Cut, in Packets containing 100 each.

5	6	$7\frac{1}{2}$	$9\frac{1}{2}$	$13\frac{1}{2}$	$15\frac{1}{2}$ in. diam.
5d.	9d.	10d.	1/	1/9	2/ per packet
4/	5/6	7/6	9/	16/	18/ per bundle of 1,000

568 **RHENISH FILTER PAPERS.**

These Papers are manufactured by Messrs. Schleicher and Schüll, Rhenish Prussia, and are recommended as a substitute for Swedish.

Filter Papers. No. 595.—A good light paper, free from Chlorine, tasteless, and made of the Best Materials—
$18\frac{3}{4} \times 21\frac{1}{2}$ in., per quire of 25 sheets £0 1 6
,, ,, ream of 500 ,, 1 5 0

Cut in Circles, in Packets of 100, and Bundles of 1,000.

Diam. in cm.	4·25	5·5	7	9	11	12·5	15	18·5	24	27	32	38·5
,, inches	$1\frac{3}{4}$	2	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	5	$5\frac{7}{8}$	$7\frac{1}{4}$	$9\frac{1}{4}$	$10\frac{5}{8}$	$12\frac{1}{4}$	$15\frac{1}{4}$
Price per 100	4d.	4d.	4d.	5d.	6d.	7d.	9d.	1/	1/8	2/5	2/11	3/5
,, 1,000	2/9	2/9	3/	4/	4/9	5/	7/3	8/9	15/9	22/	26/10	31/6

Filter Papers. No. 597.—A much stouter Paper and filters quickly— $22\frac{3}{4} \times 22\frac{3}{4}$ in., per quire of 25 sheets £0 2 6
,, ,, ream of 500 ,, 2 6 0

Cut in Circles, in Packets of 100, and Bundles of 1,000.

Diam. in cm.	4	5·5	7	9	11	12·5	15	18·5	24	27	32	38·5	50
,, inches	$1\frac{5}{8}$	2	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	5	$5\frac{7}{8}$	$7\frac{1}{4}$	$9\frac{1}{4}$	$10\frac{5}{8}$	$12\frac{1}{4}$	$15\frac{1}{4}$	$19\frac{3}{4}$
Price per 100	5d.	5d.	5d.	7d.	10d.	10d.	1/	1/4	2/1	2/9	3/4	4/5	7/6
,, 1,000	3/10	3/10	4/	5/10	7/	7/6	9/6	12/6	19/	25/	30/6	40/	66/

Filter Papers. No. 598.—Extra stout, for very fine precipitates—
$22\frac{3}{4} \times 22\frac{3}{4}$ in., per quire of 25 sheets £0 4 6
,, ,, ream of 500 ,, 3 18 0

Filter Papers. No. 589. For Quantitative work, Chemically pure, washed by means of Hydrochloric and Hydrofluoric Acids, and leaves only the smallest traces of ash—

Diam. in cm.	5·5	7	9	11	12·5	15
Price per 100	1/7	1/9	2/8	3/2	3/6	4/2
,, 1,000	15/	16/	24/	29/	32/	38/

,, No. 589. **Black Band.** A more loose pulped and rapid filtering paper, especially adapted for Iron Ore analysis, same price as No. 589.

,, No. 590.— Chemically pure, the washing operation of Hydrochloric and Hydrofluoric Acids has been carried to the utmost limit possible, having still less ash than No. 589—

Diam. in cm.	5·5	7	9	11	12·5	15
Price per 100	1/11	2/2	3/3	3/11	4/4	5/3
,, 1,000	18/	20/	30/	36/	40/	48/

,, No. 588.—**Folded Filters,** free from Chlorine and Sulphurous Acid—

Diam. in cm.	12·5	18·5	24	32	38·5	50
,, inches	5	$7\frac{1}{4}$	$9\frac{1}{2}$	$12\frac{1}{2}$	$15\frac{1}{4}$	$19\frac{3}{4}$
Price per 100	1/2	1/10	2/8	4/4	5/6	8/6
,, 1,000	9/10	15/4	22/	35/2	46/2	72/7

The three largest sizes can be supplied with Parchment Points, so as to bear considerable pressure. Adapted for Molasses, Fruit Juices, Liquors, &c., and are sold as No. 580.

Filter Papers. No. 580.—

Diam. in cm.	32	38·5	50
Price per 100	5/	6/4	9/4
,, 1,000	44/	55/	82/6

,, No. 572—For filtering large quantities of Syrups, Greasy, Ethereal or Mineral Oils, and muddy Wines—

Diam. in cm.	40	50
,, inches	$15\frac{3}{4}$	$19\frac{3}{4}$
Price per 100	8/3	12/9
,, 1,000	71/6	112/6

,, No. 575.—Extra Hard, can be used instead of Platinum Cone or as support for the largest Filters under pressure, also can be washed and used again several times. In Packets of 100 each

4	5·5	7	9	11	12·5	15	18·5	24	27	32	38·5	50	cm.
1/4	1/7	1/9	2/9	3/3	3/6	4/3	5/6	8/6	11/	13/6	17/6	29/	per packet
12/	15/	16/	24/	29/	32/	38/	49/	76/	100/	122/	160/	264/	per 1,000

Filter Papers. No. 581.—"Free from Starch." $18\frac{3}{4} \times 21\frac{1}{2}$ in., per quire of 25 sheets £0 1 6

„ No. 602.—Frosted-Hard. This paper is similar to No. 597 but harder and closer, and is used for very fine precipitates ..... per quire of 25 sheets 0 2 6

„ „ ream of 500 „ 2 6 0

„ No. 571.—Fat Extracted Paper for Milk Analysis, as recommended by W. A. Adams. In strips $22\frac{1}{2} \times 2\frac{1}{2}$ in., packed in cardboard boxes containing

25, per box 0 2 6

100, „ 0 8 0

„ No. 601.—Drop Reaction Paper. This Paper possesses the property of absorbing a drop rapidly, without allowing it to spread too much, thus giving a more exact zone absorption than would be the case by using Porcelain Plates. In sheets $5\frac{1}{2} \times 8\frac{3}{4}$ in., per 100 0 6 0

SWEDISH FILTER PAPERS.

572 **Filter Papers.** No. 1F.—Muncktill's Mark—

21 × 17 in., per quire 0 4 0

„ „ ream 3 10 0

Cut in Circles in Packets of 100.

5·5	7	9	11	12·5	15	18·5	cm. diam.
$2\frac{1}{4}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$4\frac{1}{4}$	5	6	$7\frac{1}{4}$	in. diam.
4d.	5d.	8d.	10d.	1/	1/3	1/9	per 100
3/	3/9	6/	7/6	9/	11/	16/	per 1,000

„ No. 2. 21 × 17 in. ... ... per quire 0 3 0

„ ... ... „ ream 3 0 0

Cut in Circles in Packets of 100. Prices same as No. 1F.

„ No. 0.—Extracted with Hydrochloric and Hydrofluoric Acids and washed free from colour, contains no Acid and the smallest quantity of ash, which is insoluble with the greatest heat—

21 × 17 in. ... ... per quire 0 6 0

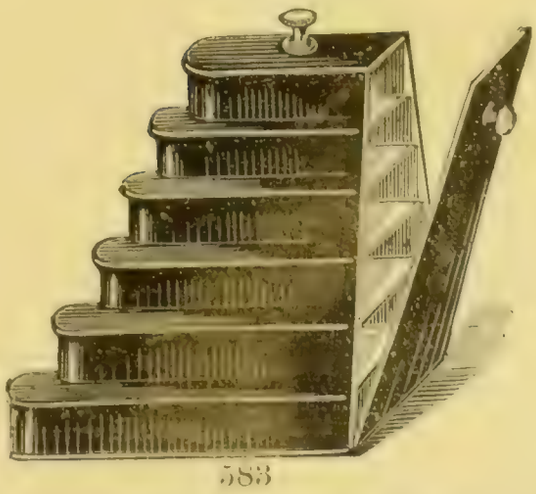
„ ... ... „ ream 5 10 0

Cut in Circles in Packets of 100.

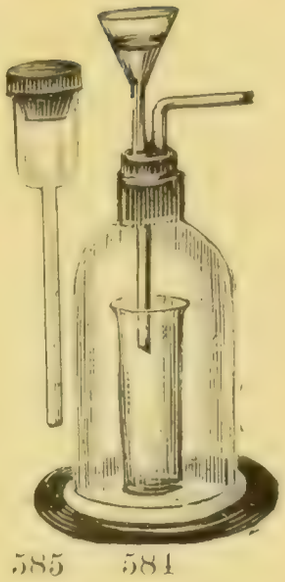
5·5	7	9	11	12·5	15	cm. diam.
$2\frac{1}{4}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$4\frac{1}{4}$	5	6	in. diam.
8d.	10d.	1/3	1/9	2/	2/6	per 100
5/6	7/	11/	14/6	17/	22/	per 1,000



582



583



585 584

582 **Filter Cases,** Japanned Tin, to contain 1 Packet—

2½	3	4	5	6	8 in diam.
4d.	5d.	6d.	7d.	8d.	1/ each

583 „ Japanned Tin, to contain 2 Packets of each size £0 7 0

584 **Quick Filtering Apparatus** (Plimpton's), as used at the University College, London, complete with Porcelain Perforated Filter Plate 0 8 0

585 „ with Cylindrical Funnel and India Rubber Cone for use with Perforated Platinum or Porcelain Crucible, extra 0 1 6

585A „ for use with Perforated Platinum or Porcelain Crucible ... ... each 0 3 6

585B Perforated Porcelain Crucible for use with above 0 0 6

585C „ Platinum „ „ „ about 3 0 0

586 **Paper,** Glazed, for Sampling, White, Yellow, and Black, per quire 0 1 3

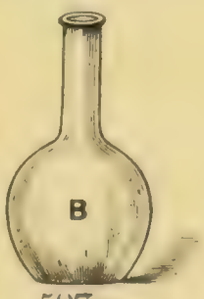
per ream 1 0 0

Flasks, Gauged and Marked (*See Graduated Instruments*).

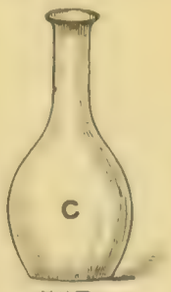
FLASKS



587A



587B



587C

FLASKS

For Boiling, Best White Bohemian Hard Glass.

587 **Flasks.** A. Flat Bottom. B. Welted Neck. C. Pear Shape. Smallest Welted Neck 8 oz., and Pear Shape 4 oz. Either form the same price.

Capacity, ozs.	Per Doz.	Price each.	Capacity, ozs.	Per Doz.	Price each.
1 ...	2/ ...	£0 0 2	40 ...	11/ ...	£0 1 0
2 ...	2/6 ...	0 0 3	48 ...	12/ ...	0 1 1
4 ...	3/9 ...	0 0 4	64 ...	13/ ...	0 1 2
6 ...	4/6 ...	0 0 5	80 ...	15/ ...	0 1 4
8 ...	5/6 ...	0 0 6	100 ...	17/ ...	0 1 6
12 ...	6/6 ...	0 0 7	130 ...	20/ ...	0 1 9
16 ...	7/6 ...	0 0 8	160 ...	28/ ...	0 2 6
20 ...	8/6 ...	0 0 9	200 ...	— ...	0 3 0
24 ...	9/ ...	0 0 10	240 ...	— ...	0 3 6
32 ...	10/ ...	0 0 11	320 ...	— ...	0 4 0



587E

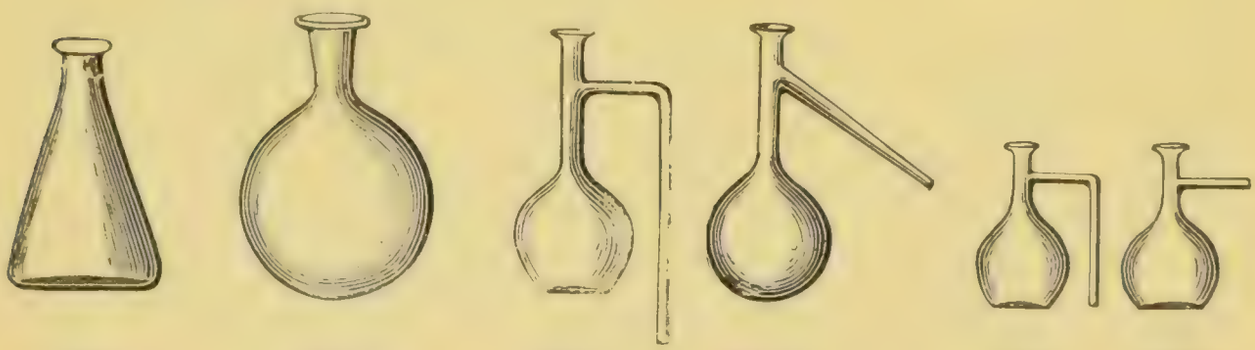
587E **Beaker Flasks,** Best Hard Bohemian Glass—

Capacity	100	200	400	600	800	1,000 c.c.
	3/	4/6	5/6	7/	8/6	10/6 per doz.

588 **Flasks,** Best White German Glass, same form as Bohemian—

Capacity, ozs.	Each.	Price per doz.	Capacity, ozs.	Each.	Price per doz.
1	2d.	£0 1 4	16	4½d.	£0 3 9
2	2d.	0 1 6	20	5d.	0 4 0
4	2d.	0 1 10	24	6d.	0 5 6
6	3d.	0 2 3	32	7d.	0 6 0
8	3d.	0 2 8	40	8d.	0 7 0
10	3d.	0 2 10	48	10d.	0 9 0
12	4d.	0 3 0	64	11d.	0 10 0

Quantities less than 1 doz. charged in all cases at single prices.



589 590 591A 591B 592A 592B

589 **Flasks,** Best Bohemian, Conical form—

Capacity	2	4	6	8	10	12	16	24	32 oz.
	2/	2/6	3/	3/	3/6	4/	4/6	5/6	6/ per doz.

590 ,, Bohemian, Globular (Bolt Heads), with Welted Neck—

Capacity	10	18	36	48 lbs.
	2/6	4/6	5/6	7/6 each

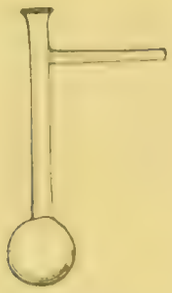
591 ,, with Side Tube from neck, for distillation of small quantities, either form, A or B, same price.

Capacity	1	2	4	8	12	16	24	32	48 oz.
	3d.	5d.	6d.	9d.	10d.	1/	1/3	1/6	1/9 each
	2/9	4/	5/	8/	9/	11/	14/	17/	20/ per doz.

592 ,, with Side Tube, Yeast Forcing Flasks, for Brewers, either form, A or B, same price.

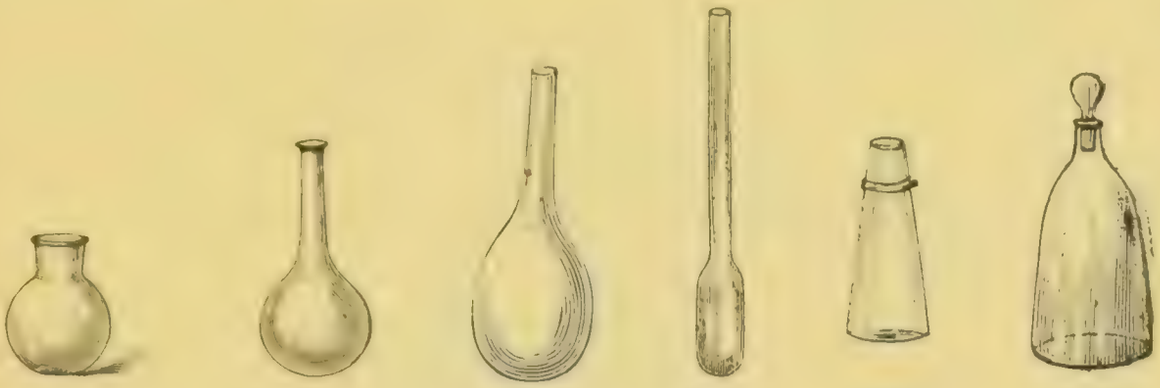
Capacity	2	4 oz.
	4/	6/ per doz.

India Rubber Corks for above, per doz. 3/.



593

593 **Flask,** with Side Tube for Estimating Gas Tar Products,
Bulb 1 oz. capacity ... ... per doz. £0 4 0



594 595 597 598 599 600

594 **Flasks,** Carbonic Acid—

Capacity	1	2	3	4	5	6	8 oz.
	3d.	3d.	3d.	4d.	4d.	5d.	6d. each
	2/	2/6	2/9	3/3	3/6	4/	5/ per doz.

595 ,, Bohemian Glass, round bottom—

Capacity	4	8	12	16 oz.
	4d.	6d.	8d.	10d. each

596 ,, Extra Hard Glass for preparing Oxygen, round bottom—

Capacity	4	8	12	16 oz.
	6d.	8d.	10d.	1/ each

597 ,, German, Florence Oil Pattern ... ... per doz. £0 4 0

598 ,, Assay, Bulb, Best German Glass—

Capacity	2	3	4 oz.
	2/6	3/3	4/ per doz.

599 ,, Assay, Conical Parting, Best German Glass—

Capacity	4	6	8	10	12	16	20	24 oz.
	3/	3/6	4/6	5/6	6/6	7/6	10/	12/ per doz.

600 ,, with Globe Stopper, for Silver Assay, as used in the Bombay Mint ... ... per doz. £1 10 0



601



602

601 **Flasks**. Assay, for Anthraquinone, 24 oz. capacity, with Tube 34 in., Stoppered in Neck ... ... each £0 3 6

602 ,, Sir J. Lister's, for the Cultivation of Bacteria. Capacity 500 c.c. 0 1 6

602A ,, Pasteur's, Round Bottom with Side Tube Pointed—

Capacity	250	500	1,000 c.c.
	1/6	2/6	3/6 each

602B ,, Miguel's, with Funnel, 250 c.c. 0 1 6

602C ,, Shallow, with perfectly Flat Bottom, for Cultivation of Bacteria—

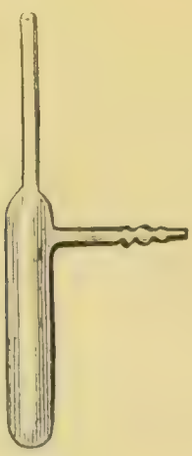
Capacity	8	16 oz.
	8d.	1/ each



603



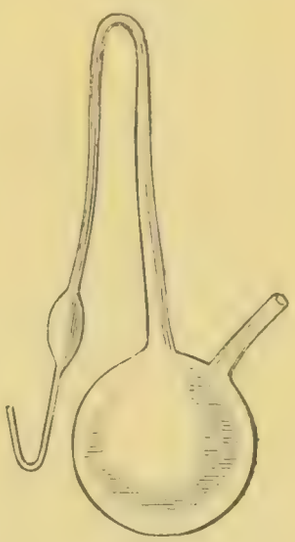
604



605



606



607

603 **Pasteur's Flasks**, with Side Tube and long Bent Arm—

Capacity	250	500	1,000 c.c.
	1/6	2/	3/ each

604 ,, ,, with Side Tube—

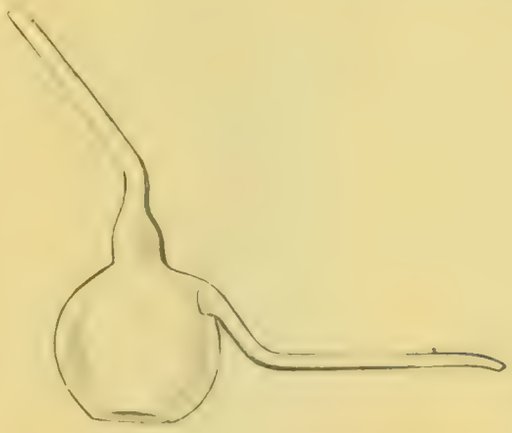
Capacity	125	250	500	1,000	2,000 c.c.
	8d.	10d.	1/3	2/	3/ each

605 ,, ,, Cylindrical, with Side Tube pointed ... each £0 0 10

606 ,, ,, ,, ,, ,, bent ... ,, 0 0 10

607 ,, ,, Round or Pear Shape, with bent Tube and Bulb—

Capacity	125	250	500	1,000	2,000 c.c.
	1/	1/6	2/6	3/	4/ each



608



609



610

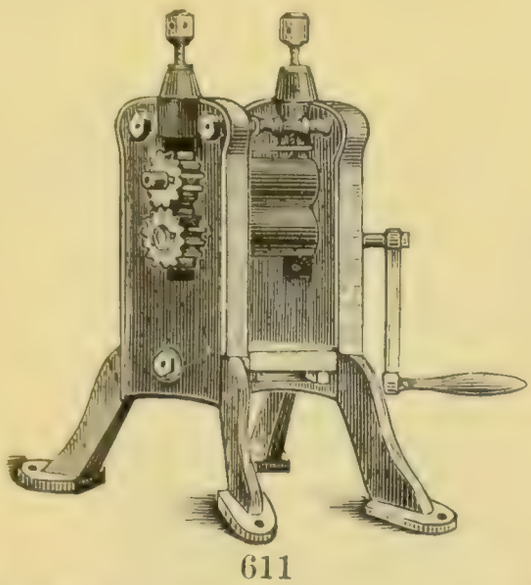
608 **Pasteur's Flask,** with Side Tube and bent Neck, same price as 607.

609 ,, ,, with Cover— Capacity 50 100 c.c.

10d. 1/ each

610 **Flask, Bunsen's Erlenmeyer,** for Filtration—

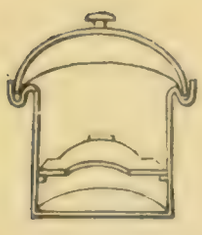
Capacity	250	500	750	1,000 c.c.
10 l.	1/3	1/5	1/9	each



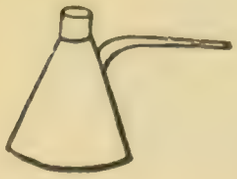
611

611 **Flatting Mill,** Best Make, Steel Rollers and Two Handles—

Width of Roller	2	in.	...	...	...	...	each	£4	10 0
,,	2½	,,	...	...	...	...	,,	5	10 0
,,	3	,,	...	...	...	...	,,	6	10 0



612



613



614

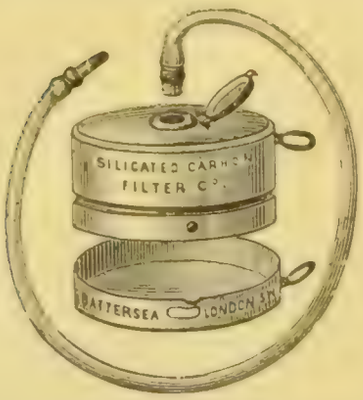
612 **Fluoric Acid Apparatus,** Brunner's, made of Lead, diam. 4 × 4 in. ... each £0 8 0

613 ,, ,, with Tubulure (Retort), capacity about 1 pint ... ... each 0 7 6

614 ,, ,, Retort and Receiver, diam. 3½ in. ,, 0 12 6

SILICATED CARBON FILTERS.

615

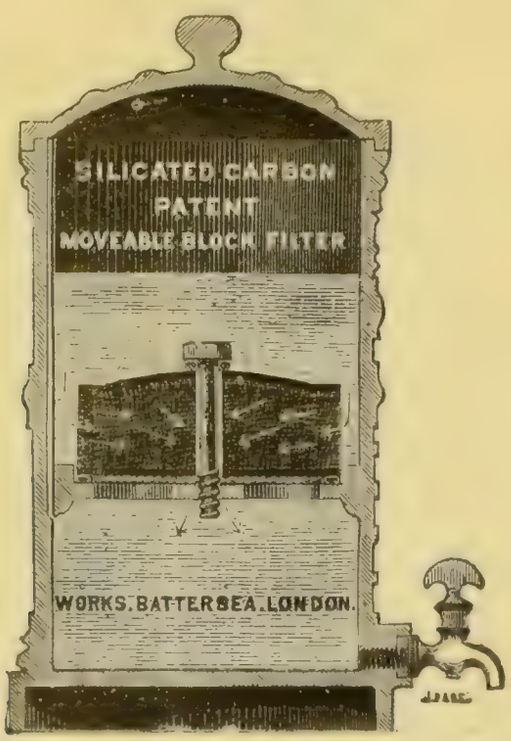


616



615	**Syphon Filter,** for Travellers, $2\frac{1}{2}$ in. diam., in Metal Box	£0	3	0
	,, Do. $3\frac{1}{2}$,, Stoneware, in Metal Box	0	6	0
	,, for Emigrants, 5 in. diam., Stoneware, with Silver-plated Tap, in Enamelled Metal Box	0	14	0
	,, Pocket Filter, for carrying over shoulder, as supplied to the Forces in Abyssinia, Ashantee, Zululand, and Egypt	0	3	6
	,, Do. do. Nickel-plated, designed by Major Fraser, R.E., and specially recommended by the Horse Guards for Officers' Kits ...	0	5	0
616	**Silicated Carbon Filter,** for Table use, 1 pint ... each	0	2	6
	,, ,, ,, Do. 2 ,, ... ,,	0	4	6
	,, ,, ,, Do. 3 ,, ... ,,	0	6	0

617



DOMESTIC FILTERS. *With Patent Moveable Blocks only.*

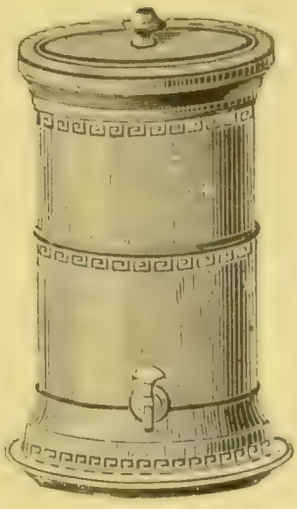
In Cream-Coloured Stoneware, with Covers and Plated Taps.

617 **Domestic Filters,** with Patent Moveable Blocks only—

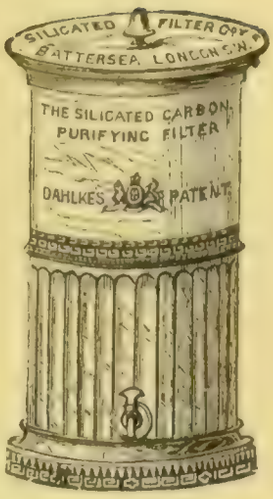
O, $\frac{1}{2}$ gal.	A, 1 gal.	B, 2 gals.	C, 4 gals.	D, 6 gals.	E, 8 gals.	F, 12 gals.
10/6	14/6	21/	32/	42/	52/	70/ each



618



618A



618B

618 **Silicated Carbon Filters,** Ornamental Stoneware, Silver-plated Tap—

O, ½ gal.	A, 1 gal.	B, 2 gals.	
15/	22/6	30/	each

Extra Charges of Granular Silicated Carbon, 8d., 1/, 1/6 each.

618A **Refrigerator Filter.** Capacity Two Gallons. With Silver-plated Tap £1 11 6

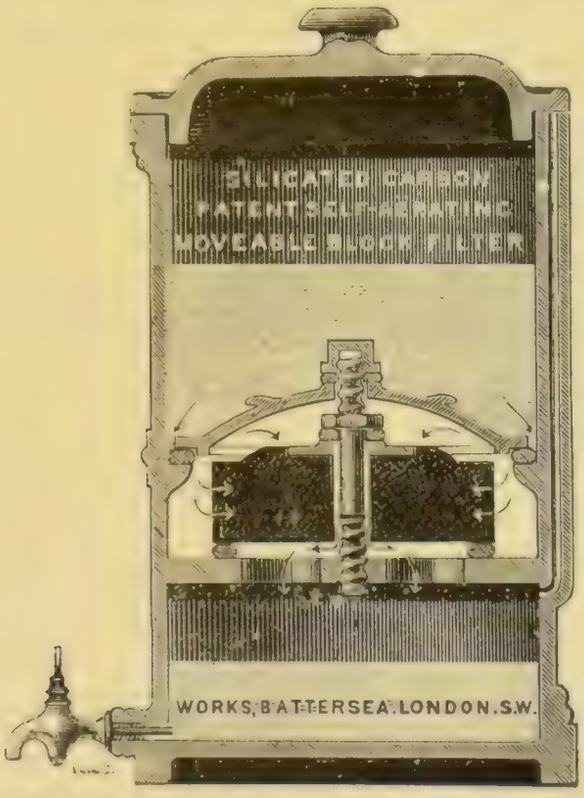
Extra Charges of Granular Silicated Carbon, 1/6 each.

Specially adapted for Tropical Climates.

618B **Dining Room Filter,** made in Marbled China—

A, 35/ ... B, 80/

Extra Charges of Granular Silicated Carbon—A, 1/6; B, 2/6 each.



619

S.A. DOMESTIC FILTERS. *With Patent Moveable Block and Self-Aërating Covers.*

In Cream-Coloured Stoneware, with Covers and Plated Taps.

619 **S.A. Domestic Filters,** with Aërator Covers—

O, ½ gal.	A, 1 gal.	B, 2 gals.	C, 4 gals.	D, 6 gals.	E, 8 gals.	F, 12 gals.	
12/	16/6	24/	36/	46/	58/	78/	each

Extra Charges of Granular Silicated Carbon for S.A. Filters—

8d.	1/	1/6	2/	2/6	3/6	4/6	„

619A **Domestic Filters** (as 619), in Cream-Coloured Stoneware, with Plated Taps and Patent Moveable Blocks—

No. 27. O. ½ gal. 10/6 each
A. 1 „ 14/6 „
B. 2 „ 21/ „
C. 4 „ 32/ „
D. 6 gals. 42/ each
E. 8 „ 52/ „
F. 12 „ 70/ „

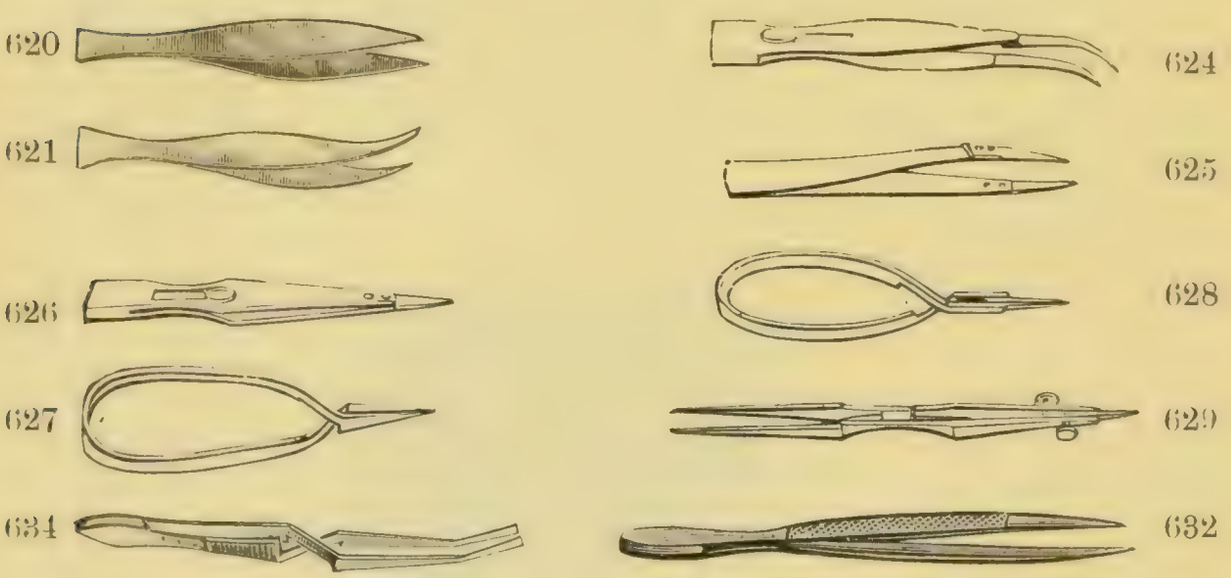
619B **Dining Room Filters,** in Marbled China, with Plated Taps and Patent Moveable Blocks—

No. 22. A. 2 gals. 35/ each
B. 5 „ 80/ „

Refrigerative Terra Cotta, do. do.—
No. 25. 2 gals. 31/6 each

Filters of all makes can be refitted on this principle, 1 gal. 8/6, 2 gals. 10/, 4 gals. 12/ each. Larger sizes in proportion.

FORCEPS.



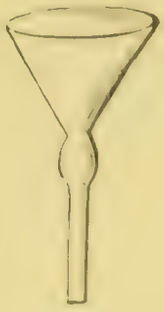
620	**Forceps,** Brass (Nickel Plated) ... ... each 6d. and	£0	0	8
621	,, ,, ,, ,, with curved ends ,, 6d. ,,	0	0	8
622	,, Steel, straight, length 4 in. ... ... each	0	0	6
624	,, Brass, with Steel Points and Studs, with curved ends ... ... each	0	1	6
625	,, ,, with Ivory Points, straight ... ... ,,	0	2	6
626	,, ,, with Platinum Points and Studs... ... ,,	0	4	6
627	,, Steel Bow ... ... each 8d. and	0	1	0
628	,, ,, with Platinum Points ... ... each	0	4	0
629	,, Steel, Double, for Lifting or Fixing ... ... ,,	0	2	6
630	,, ,, with Platinum Points at one end ... ,,	0	5	0
632	,, Polished Steel ... ... 4 in. 1/., 5¼ in. ,,	0	1	6
633	,, ,, with Platinum ends ... ... ,,	0	4	6
634	,, Steel, 4 in., Flat Points for lifting Micro Circles, &c. ,,	0	2	0

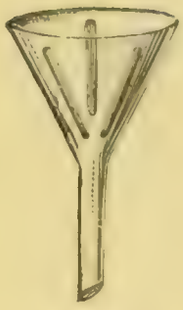
FUNNELS.


A


B


641


642


643

639 **Funnels,** Best Bohemian Glass, with Ground Edges, the sides inclined at an angle of 60°, plain or ribbed (A or B)—

1	1½	2¼	2¾	3¼	3¾	4¼	4¾	5½	6½	7½	8½	9½	10¾ in. diam.
3d.	3d.	4d.	5d.	6d.	7d.	8d.	10d.	1/	1/3	1/6	2/3	3/	3/6 each
2/9	2/9	3/9	4/6	5/6	6/6	7/6	9/	11/	14/	17/	26/	—	— per doz.

640 **Funnels,** Best German Glass, plain or ribbed (A or B)—

1	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10 in. diam.
1½d.	2d.	2d.	2½d.	3d.	3½d.	4d.	5d.	6d.	8d.	10d.	1/3	1/6	2/3 each
1/4	1/4	1/6	2/	2/6	3/	3/6	4/6	5/6	7/6	9/6	14/	17/	24/ per doz.

641 **Funnels,** for covering Evaporating Basins, Victor Meyer—

6	8	10 in. diam.
2	3/	5/ each

642 ,, with Bulb, for filtering, with Glass Wool—

3	4	5 in. diam.
4d.	6d.	8d. each

643 ,, Hehner & Richmond's Rapid Filtering, with Four Ribs inside—

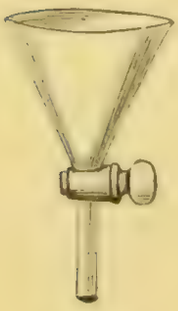
Diam. 3¼ in. 8d. 3¾ in. 9d. each

643A ,, Ditto improved form, with Deep Conical Ribs, for quick filtering—

Diam. 2¾ in. 8d. 4¼ in. 9d. each



644



645



646



649

644 **Funnels,** Thin Blown Glass, set of three small—
Diam. $\frac{1}{2}$ in. to $1\frac{1}{2}$ in. ... ... per set £0 0 4

645 ,, Bohemian Glass, with Glass Stopcock (*See also Separators*)—

$4\frac{1}{4}$	$4\frac{3}{4}$	$5\frac{1}{4}$	$6\frac{1}{4}$	$7\frac{1}{2}$	$8\frac{1}{4}$	$9\frac{3}{8}$ in. diam.
5/	5/6	6/6	7/	8/	9/	10/6 each

645A ,, German Glass, with Stopcock—

3	4	5	6 in. diam.
3/6	4/6	5/	5/6 each

646 ,, White Stoneware, Fluted inside—

$2\frac{3}{4}$	$3\frac{3}{8}$	$4\frac{1}{4}$	$5\frac{1}{2}$	$6\frac{1}{8}$	7	$7\frac{1}{2}$	$8\frac{1}{8}$	$8\frac{7}{8}$ in. diam.
5d.	7d.	1/	1/9	2/6	3/	3/6	4/	5/ each

648 ,, Meissen Porcelain, deeply fluted—

$1\frac{1}{4}$	$2\frac{3}{4}$	$3\frac{1}{2}$ in. diam.
1/4	1/6	2/ each



648A



648B



648C

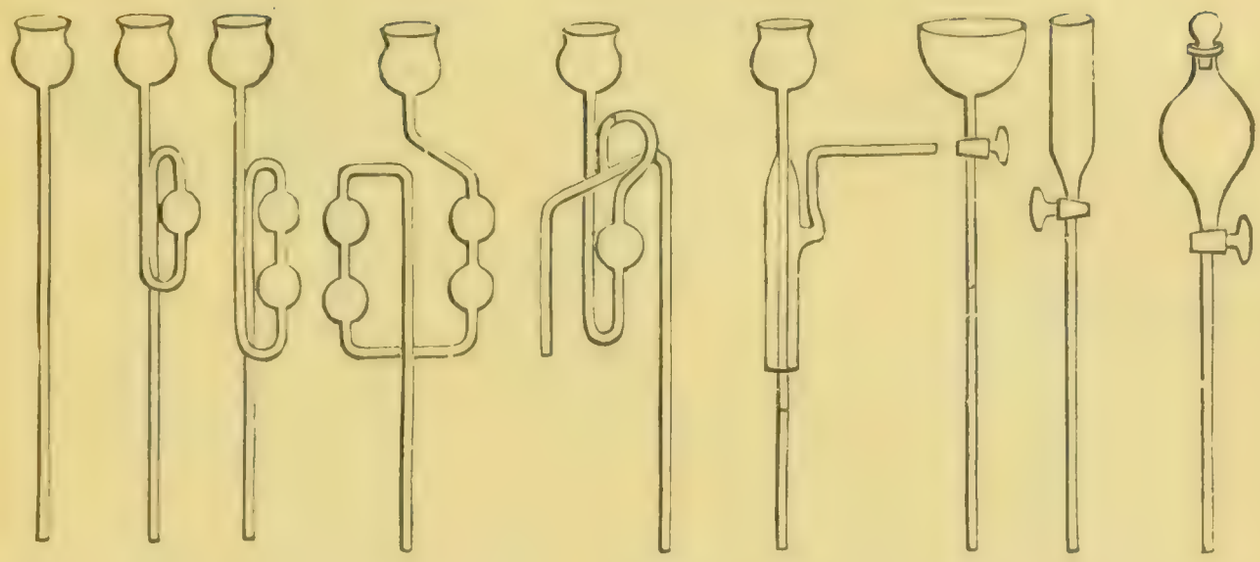
648A **Funnels,** Porcelain, Hirsch's, with Perforated Filter Plate—

$2\frac{3}{4}$	$3\frac{1}{2}$	$4\frac{1}{4}$	5	$5\frac{1}{2}$	$6\frac{1}{4}$ in. diam.
1/9	2/	2/6	3/	4/	5/ each

648B ,, Porcelain, Hirsch's, 4 in. diameter, depth to Filter Plate $1\frac{1}{8}$ in. ... ... each £0 3 6

648C ,, Copper, set of three, for filling Combustion Tubes, 1 in., $1\frac{1}{4}$ in., $1\frac{1}{2}$ in. diameter ... ... per set 0 2 6

649 **Glass Rods,** bent, for quick Filtering ... ... per doz. 0 1 0



650 651 652 653 654 655 656 657 658

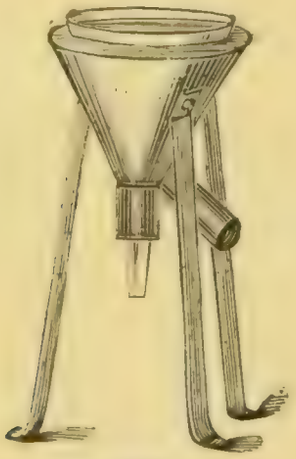
650 **Funnels,** Safety, with long Tube for fitting up Gas Flasks, &c.—

		Length 6 in. to 8 in., each 2d.	...	per doz.	£0	1	6
		„ 10 in. to 12 in. „ 2½d.	...	„	0	2	0
		„ 14 in. „ 3d.	...	„	0	2	6
		„ 18 in. „ 4d.	...	„	0	3	0
651	„	Safety, with one Bulb ...	...	...	...	each	0	0	5
652	„	„ „ two Bulbs	...	...	...	„	0	0	8
653	„	„ „ four „	...	...	...	„	0	0	9
654	„	„ Welters, with Arms	...	...	...	„	0	1	0
655	„	„ with Side Gas-Leading Tube...	...	„	0	1	9
656	„	„ Cup, with Stopcock	...	...	...	„	0	2	3
657	„	„ Cylinder, with Stopcock—							
		50 c.c. capacity	„	0	2	3
		100 „	„	0	2	6
658	„	„ Stoppered Bulb and Stopcock—							

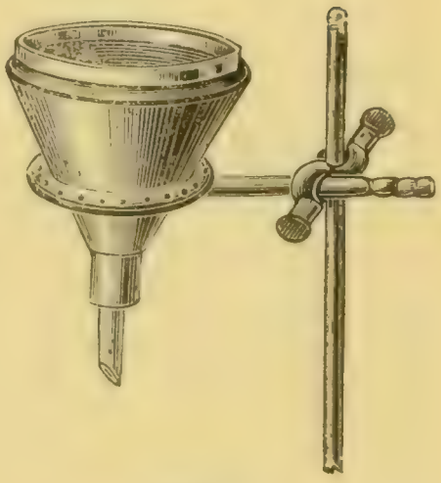
Capacity	50	100	200 c.c.
	2/6	3/	3/6 each



659



529



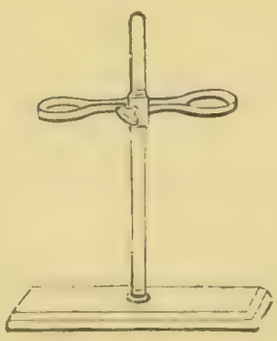
529A

659 **Funnel Jacket,** for Filtering Hot Solutions, diameter inside 6 in.—

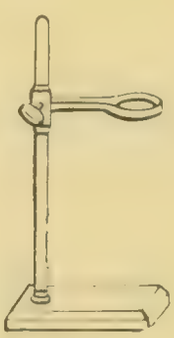
			Tin				each	£0	5	0
660	,,	,,	Copper				,,	0	10	0
660A	,,	,,	,, with Water Level				,,	0	13	6
529	,,	,,	single Jacket, on Stand with Funnel, 4 in.				,,	0	7	6
	,,	,,	double Jacket ,, ,, ,,				,,	0	12	0
529A	,,	,,	4 in. diameter, with Ring Burner and Stopcock for fixing on Retort Stand				,,	0	11	6



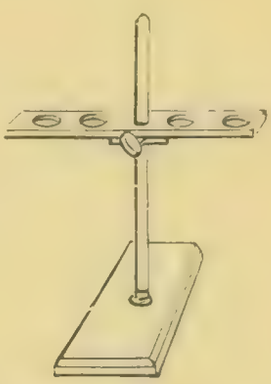
661



663



665



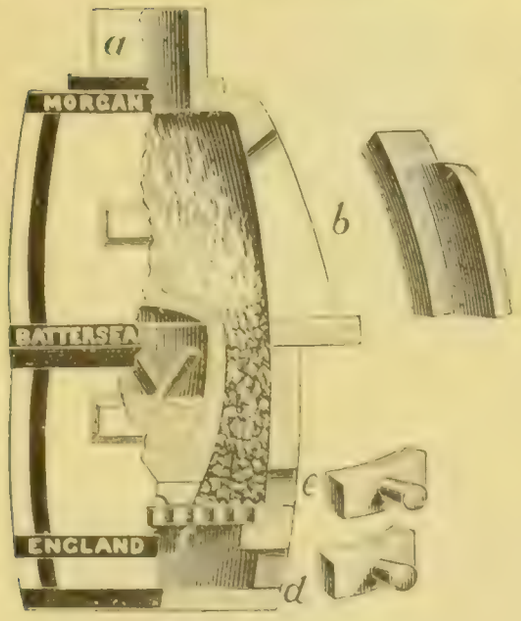
668

661 **Funnel Holder,** Turned Wood, Stained Black—

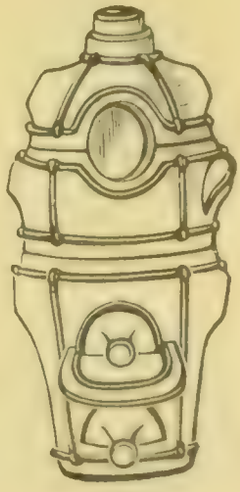
				Round Bottom, for one ...			each	£0	1	0
662	,,	,,	,,	Square Bottom			,,	0	1	6
663	,,	,,	,,	,, for two ...			,,	0	2	6
664	,,	,,	,,	for two larger Funnels ...			,,	0	5	0
665	,,	,,	,,	Teak, for one			,,	0	2	0
666	,,	,,	,,	,, two			,,	0	3	0
667	,,	,,	,,	,, two larger Funnels...			,,	0	5	0
668	,,	,,	,,	,, four			,,	0	3	6
669	,,	,,	,,	Mahogany for one			,,	0	2	0
670	,,	,,	,,	,, two			,,	0	3	0

CLAY PORTABLE FURNACES.

For Melting Gold, Silver, Copper, &c.



671



672

671 **Furnaces,** Clay, for Crucibles—

External dimensions—Diam. $9\frac{1}{4}$ in.	Height $17\frac{1}{2}$ in.	£1	5	0
,, $9\frac{3}{4}$,,	,, 20 ,,	1	10	0
,, 11 ,,	,, 22 ,,	1	15	0
,, $13\frac{3}{4}$,,	,, 26 ,,	2	12	6
,, $14\frac{1}{2}$,,	,, 28 ,,	3	10	0
,, 18 ,,	,, 32 ,,	4	10	0

672 **Furnaces,** Universal Clay. Height 22 inches, Diameter inside 6 in., outside 9 in., with chimney $3\frac{1}{2}$ in. ... ... each 0 18 0

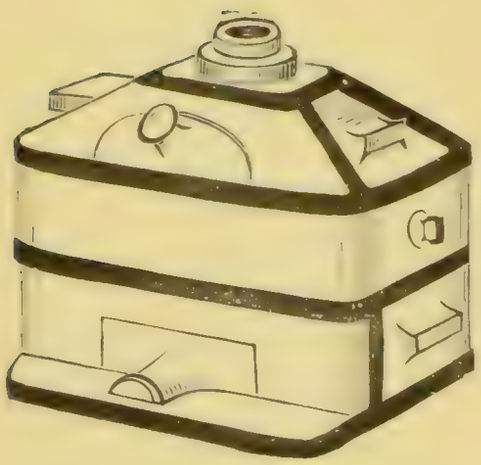
Extra Tube Ring for ditto	0	3	6
,, Muffle Ring	0	3	6
,, Base on Stand	0	3	6



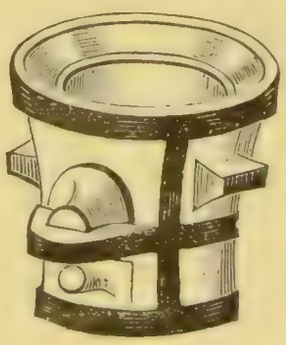
674

674 **Furnaces,** Clay, for Assaying, Enamelling, &c.—

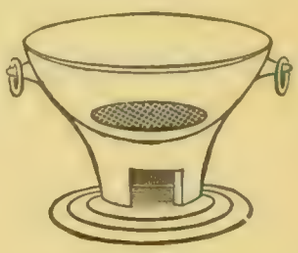
Front to Back Outside	Inside	Size of Muffles			
$12\frac{1}{2}$ in.	$9\frac{1}{4}$ in.	$8\frac{1}{2} \times 5 \times 3\frac{1}{4}$	£2	5	0
$13\frac{1}{4}$,,	10 ,,	$9 \times 5\frac{1}{2} \times 3\frac{5}{8}$	2	10	0
$14\frac{1}{2}$,,	11 ,,	$10 \times 6 \times 4$	2	15	0
$15\frac{1}{2}$,,	12 ,,	$11 \times 4 \times 3\frac{1}{8}$	3	7	6
$16\frac{1}{4}$,,	$12\frac{3}{4}$,,	$10\frac{1}{2} \times 5\frac{1}{4} \times 3\frac{7}{8}$	4	0	0
$17\frac{1}{2}$,,	$13\frac{3}{4}$,,	$12 \times 6 \times 4$	4	10	0
23 ,,	19 ,,	$15 \times 9 \times 6$	9	0	0



675



676



677A

675 **Furnaces,** Clay, for Tube Operations—

No. 1, Internal Diam.	$9\frac{1}{2}$ in.	$\times 5\frac{1}{2}$ in.	each	£1	0	0
,, 2 ,,	10 ,,	$\times 6$,,	,,	1	3	0
,, 3 ,,	$10\frac{3}{4}$,,	$\times 6\frac{3}{4}$,,	,,	1	5	0
,, 4 ,,	13 ,,	$\times 6\frac{3}{4}$,,	,,	1	10	0

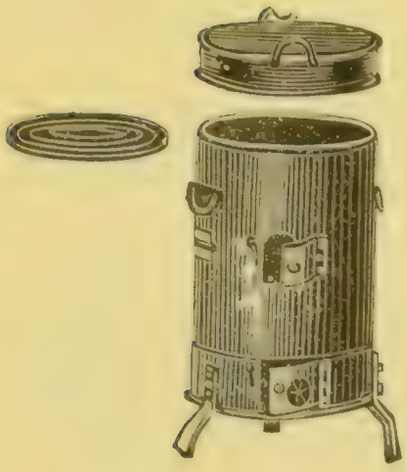
676 ,, Clay (Charcoal Chauffers), for Evaporating—

Nos.	1	2	3	4	5	6	7	8	
	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$8\frac{1}{2}$	10	$10\frac{1}{2}$	$11\frac{1}{2}$	13	in. inside diam.
	3/	4/	5/	6/6	9/	14/	18/	21/	each

677 Stout Iron Triangles for the above ... ... each extra £0 1 0

677A **Furnace,** Cast Iron, with Iron Grate, Ash-pit and Base—

8	10	12 in. diam.
4/	5/	8/6 each



678

680



679

678 **Furnace,** Stout Sheet Iron, lined with Fire Bricks, with Cast Iron Rings and Sand Bath for Assaying, Cupelling, Distilling, Evaporating, and Tube Operations. Complete with Elbow and Six Feet of Chimney—

Depth of Body, 13 in., Internal Diam.	8 in.	£3	3	0
„ 15 „ „	10 „	4	4	0
„ 19 „ „	12 „	5	5	0
Size of Muffles for £3 3 0 Furnace,	8 × 4 × 3 each	0	2	6
„ 4 4 0 „	10 × 6 × 4 „	0	3	6
„ 5 5 0 „	12 × 6 × 4 „	0	4	3

679 **Furnace,** Sheet Iron, for Charcoal Chauffer, Round ... „ 0 2 6

680 „ Hood for ditto ... ... „ 0 1 0

FURNACES FOR COMBUSTION.

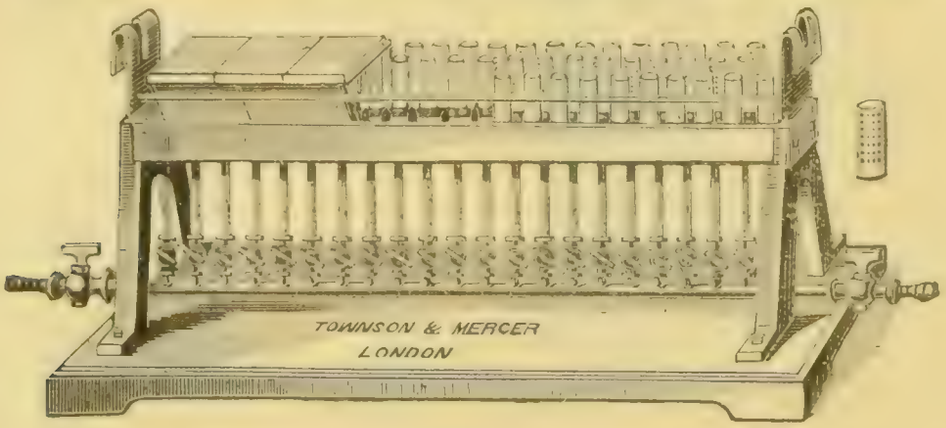


681

681 **Furnace, Combustion,** Liebig's, Sheet Iron, for Charcoal—

Length 24 in.	each	£0	4	6
„ 36 „	...	0	6	6
682 „ „ 24 „ with Cover, for Two Tubes ...	...	0	12	6

FURNACES, GAS COMBUSTION.



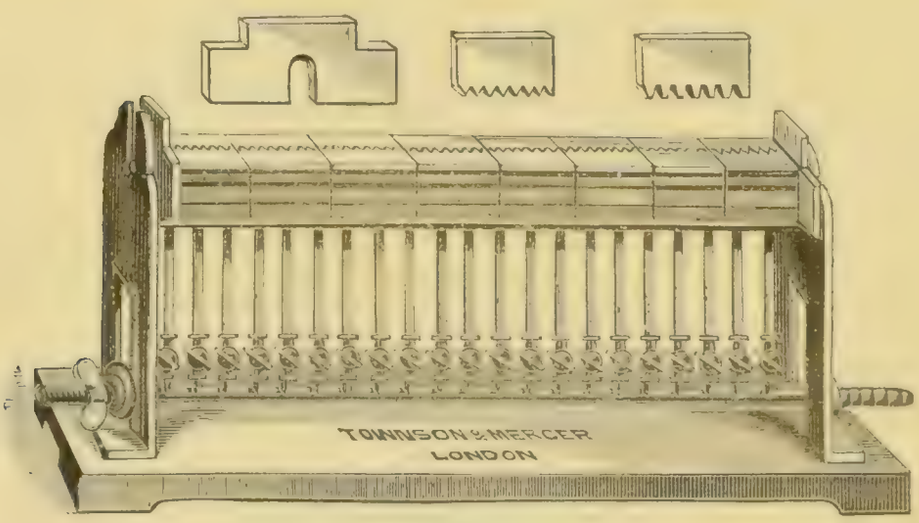
683

683 **Furnaces,** Gas Combustion, Hofmann's, Japanned Iron Body, Best Make, with Unions for Gas Connections, and Clay Burners complete—

12 in.	long,	12	Stopcocks,	36	Burners,	3	Rows,	each	£4	0 0
20	„	20	„	60	„	3	„		5	0 0
26	„	26	„	78	„	3	„		5	15 0
34	„	34	„	170	„	5	„		7	15 0

684 Fire Clay Burners per doz. small 2/6 ; per doz. large 0 3 3

685 Flat Fire Clay Plates „ 3/6 ; „ 0 4 0

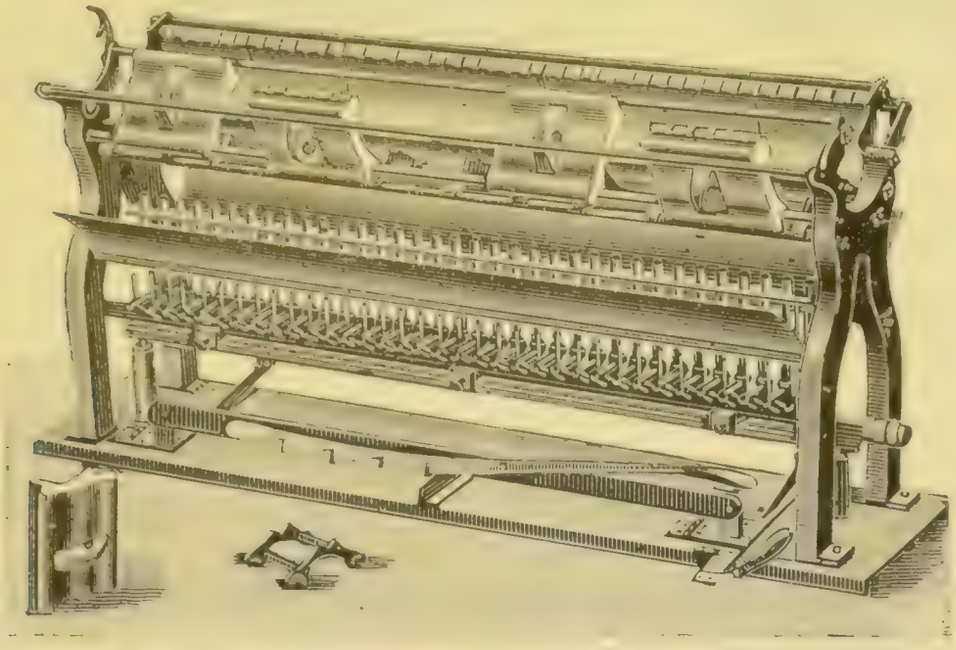


686

686 **Furnaces,** Gas Combustion, Bunsen's, Japanned Iron Body, with Unions for Gas Connection and Bunsen's Burners, complete with Clay Plates, best make—

15 inches	long,	18	Burners,	with Stopcocks ...	each	£3	0 0
17	„	24	„	„ ...	„	3	17 6
21	„	30	„	„ ...	„	4	10 0
25	„	36	„	„ ...	„	5	0 0
30	„	42	„	„ ...	„	6	6 0

687	Fire Clay End Pieces		£0	0 10
688	„ Tooth Tiles, thick	per doz.	0	5 0
689	„ „ thin	„	0	4 0
690	Combustion Tubes, Iron, closed at one end... ...	each	0	1 6



691A

691A **Furnace,** Bunsen and Babo's, Improved Form, with arrangement for raising and lowering the Burners, also for horizontal movement—

No. of Burners	15	20	30
	67/6	75/0	97/6

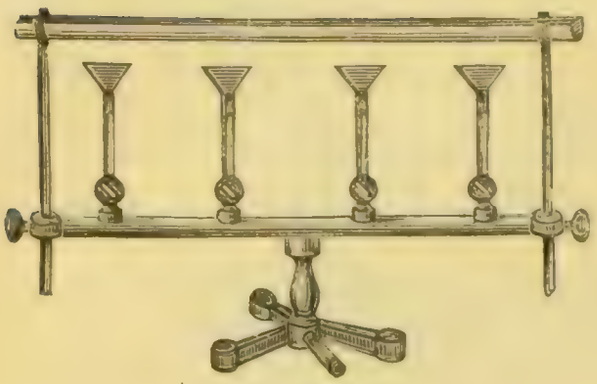
691B	Clay Tiles for above	each	£0	0	7
691C	Iron Supports	„	0	0	5



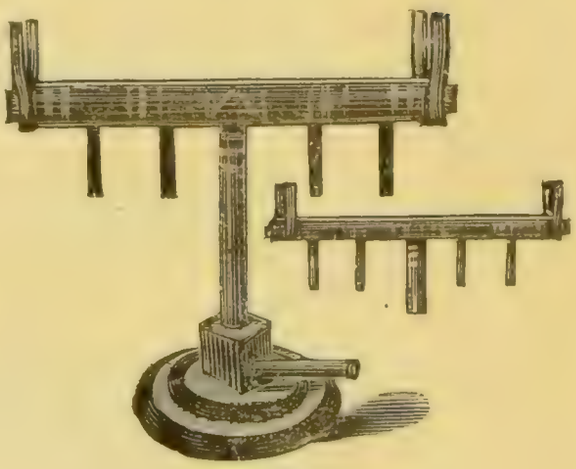
648C

648C **Funnels,** Copper, Set of 3, for filling Combustion Tubes—

1 in., 1¼ in., and 1½ in....	set	£0	2	6



692

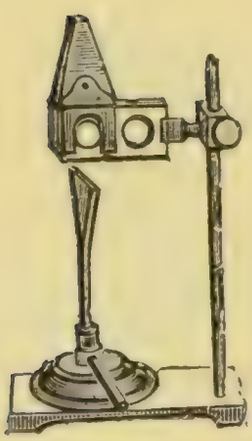


693

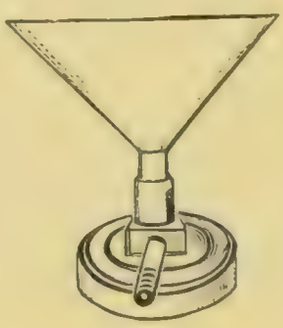
692 **Gas Furnace,** with flat Burners for heating Tube, on Iron Stand, with Brass Support and Adjusting Screws, suitable for Lecture Table £0 15 0

693 „ Professor Ramsay's, University College, London, for heating Tubes. The upper part has an aperture about $\frac{1}{16}$th inch the whole length, and is supplied with four moveable shutters, so that the whole or part can be used. At each end is a stout support for Tubes, and Bayonet Catches so that two or more can be attached. They are adapted to drop inside $\frac{3}{4}$ in. Bunsen's Burner ... each 0 9 0

Complete with Bunsen's Burner ... ... „ 0 12 0



694

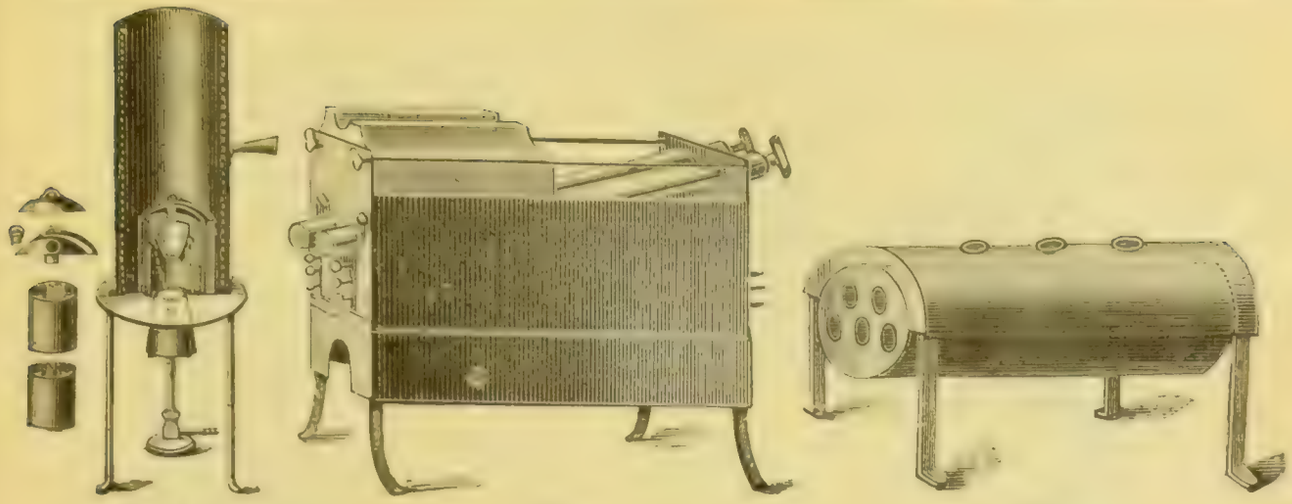


695

694 **Gas Lamp Furnace,** on Stand complete, with flat Burner, for Crucible or Tube Operations, on Iron Stand, with Adjusting Screws £0 15 0

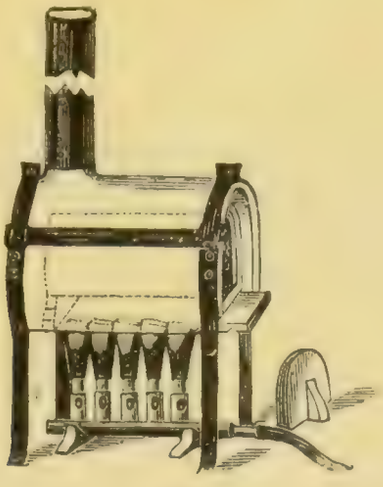
695 „ **Furnace,** with wide flat Burner, 4 in., for heating Tube... 0 5 6

Do. do. 6 in. do. ... 0 7 0



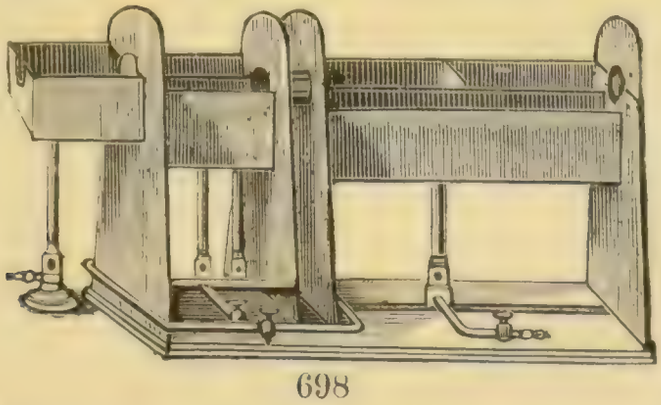
695A 695C 695D

695A **Furnace,** Crucible, with arrangement for oxydation, with Bunsen Burner and Chimney complete £0 10 6
695B ,, Larger Size, for Crucibles up to 3½ in. 0 18 0
695C ,, Habermann's, for Hot Air, Strong Sheet Iron, complete, with two Iron Tubes, on Stand... ... ... 1 15 0
695D ,, Carius', Stout Sheet Iron, Oval form, with five Tubes, and Iron Case 2 15 0



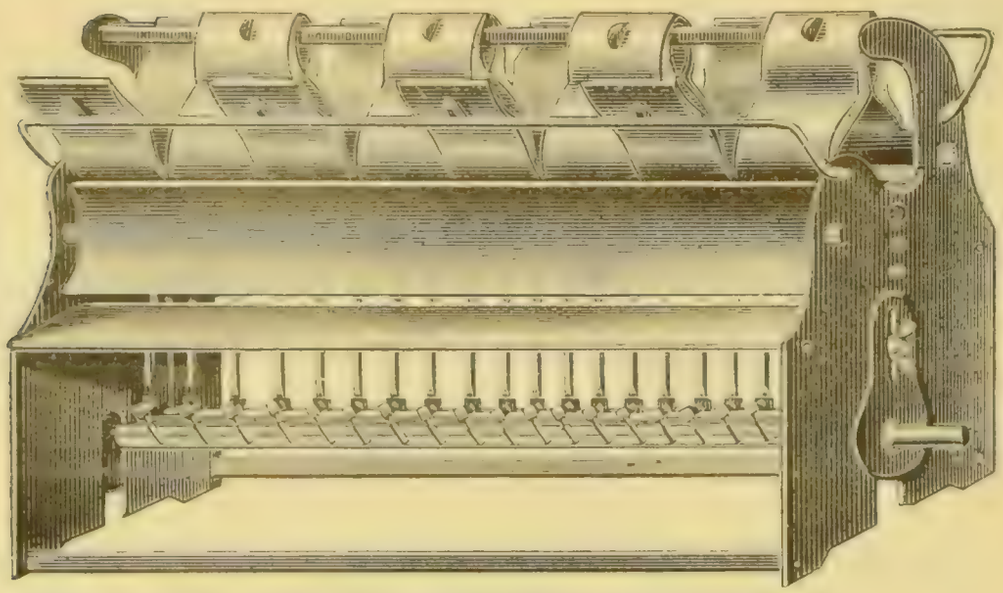
697

697 **Furnace,** Gas, French Clay, for Sugar Assay, with Burners complete £2 15 0
Muffles for the above 6½ × 4¾ × 3⅛ in. high ... each 0 2 0



698

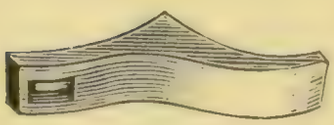
698 **Furnace,** Combustion, Kopfer's, Sheet Iron, for the Elementary Analysis of Carbon Compounds £2 0 0



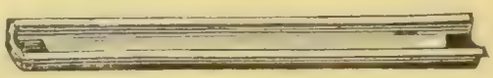
699

699 **Furnace,** Gas Combustion, Erlenmeyer's—

13 in. long, 15 Burners...	...	...	...	...	£2	17	0
18	,,	20	,,	...	...	...	...	...	3	10	0
24	,,	25	,,	...	...	...	...	...	4	5	0
32	,,	35	,,	...	...	...	...	...	5	5	0



700



701

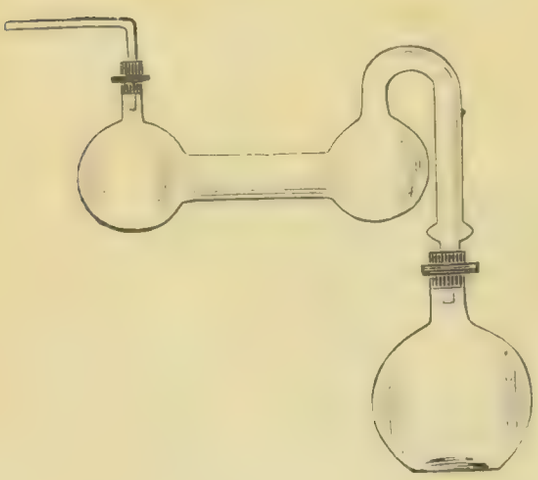
700 **Clay Plates,** for Erlenmeyer's Furnace ... ... each £0 0 7

701 ,, Troughs, thin, for support of Tube ... ,, 0 0 4

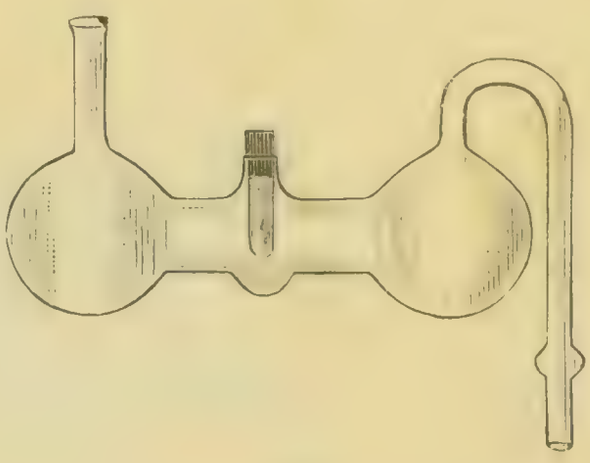
Furnaces, Gas, Fletcher's (*see Fletcher's Special List at end of Catalogue*).

Galvanic Apparatus (*see Special List*).

Gas Burners (*see "Lamps, Gas"*).



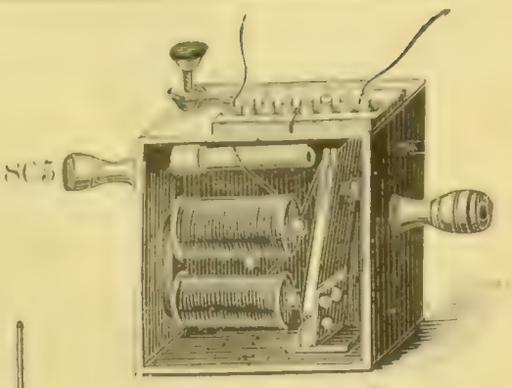
702

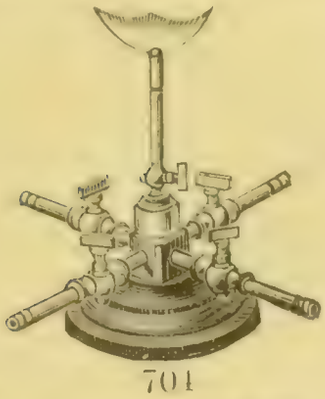


703

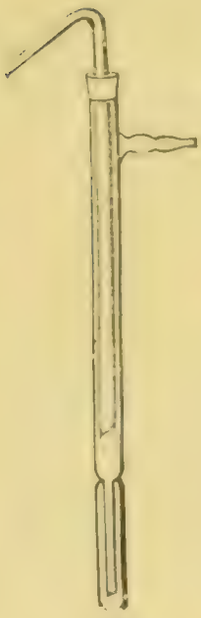
702 **Carre's Freezing Apparatus** £0 5 0

703 ,, ,, ,, ... 0 6 0


805

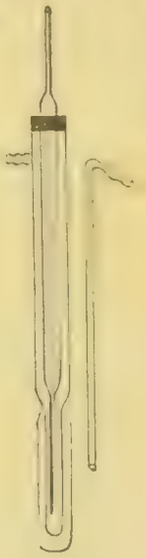

704


706


708c


707


707A


708B


708

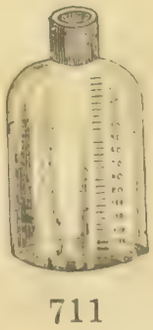

708A

704	**Gas Distributor,** with Stopcocks, four ways	£0 10	6
706	**Gas Regulator,** for Air Baths, &c., Kemp's	0 5	0
707	,, Glass, Reichardt's, for Drying Ovens, &c. ...	0 5	0
707A	,, ,, Reichardt Muencke's ,, ...	0 11	0
708	,, ,, Page's ,, ...	0 2	6
708A	,, Another form	0 3	0
708B	,, Lothar Meyers'	0 6	0
708C	,, Tollens'	0 1	6
805	,, Schiebler's, with Electro Magnet, by which the flow of gas is governed	2 2	0


709A


709


710

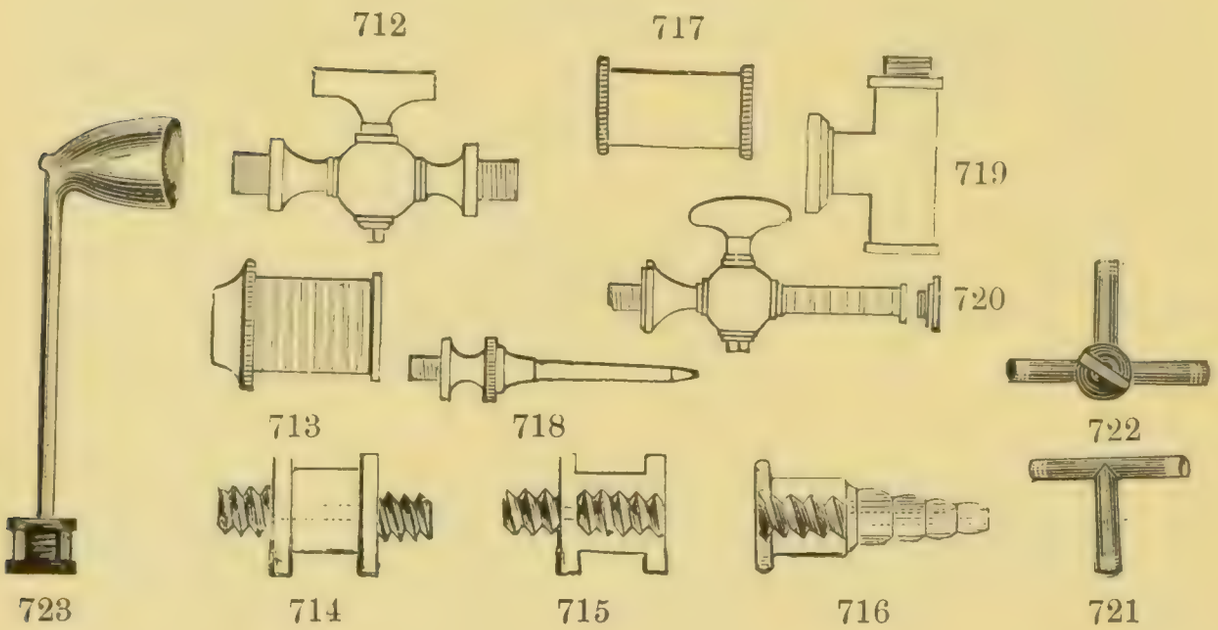

711

Gas Jars, or Receivers, open top and bottom, with or without flange—

10	16	20	30	40	60	80	100	160 ozs. capacity
8d.	9d.	10d.	1/3	1/6	2/	2/6	4/	4/6 each, Plain, Figs. 709 or 709A
710 1/	1/2	1/4	1/8	2/	2/3	3/4	5/	5/6 each, Stoppered

711 **Gas Jars,** with Brass Cap for Stopcock, Plain or Graduated into cubic inches or c.c.—

Capacity	10	16	20	30	40	60	80	100	160 ozs.
	1/6	1/9	2/	2/3	2/9	3/	3/9	5/3	6/ each, Plain
	4/	4/	4/	4/6	5/6	7/6	9/	11/6	13/ each, Graduated



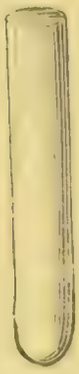
712	Brass Stopcock	each	£0 2 0
713	,, Bladder Ferrule	,,	0 0 9
714	Double Male Screw	,,	0 0 9
715	Male and Female Screw	,,	0 0 9
716	Female Screw, with elongation for India Rubber connection	,,	0 0 10
717	Brass Connector	,,	0 0 9
718	,, Jet	,,	0 0 6
719	,, T Piece	,,	0 1 6
720	,, Stopcock for Gas Bags	,,	0 4 0
721	,, T Piece, $\frac{3}{8}$ in. diam., for India Rubber connections	,,	0 0 6
722	,, Stopcock, 3 Ways	,,	0 3 6
723	**Tobacco Pipe,** Brass, with Ferrule, for Gas Experiments	,,	0 2 0



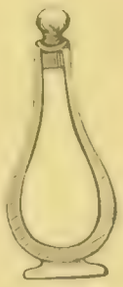
724



725



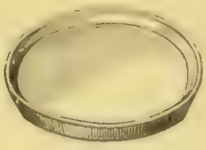
726



727



733



729

724 **Gas Cylinders**, on Foot, with flange at top, ground to fit glass plates—

Height.		Diameter.		Each.			Height.		Diameter.		Each.		
6 in.	...	$1\frac{1}{4}$ in.	...	£0	0	5	16	...	$2\frac{3}{4}$ in.	...	£0	2	6
8	...	2	...	0	0	7	20	...	3	...	0	3	6
10	...	2	...	0	0	9	$8\frac{1}{4}$	...	$4\frac{3}{4}$	..	0	2	0
12	...	2	...	0	1	0	10	...	$6\frac{1}{4}$	...	0	3	6
12	...	$2\frac{1}{2}$	...	0	1	6	12	...	8	...	0	4	6
12	...	3	...	0	2	0	14	...	$9\frac{1}{2}$	...	0	10	6
14	...	2	...	0	1	9	16	...	10	...	0	18	0
14	...	$2\frac{1}{2}$	...	0	2	0	20	...	$12\frac{1}{2}$	...	1	15	0

725 **Gas Exploding Tube**, for Mixed Gases, with Foot, Stout Glass, 6 × $1\frac{3}{4}$ in., each £0 0 10

726 ,, ,, without Foot 9 × $1\frac{3}{4}$,, 0 0 10

727 Stout Glass Detonating Bottle, Stoppered, for Firing Mixed Gases 0 1 6

728 **Gas Tubes**, sealed at one end, edge ground—

6 × $\frac{3}{4}$	7 × $\frac{3}{4}$	10 × 1	10 × $1\frac{1}{8}$ in.
6d.	8d.	10d.	1/ each

729 **Gas Trays**, Ivory Stoneware, shallow, for removing Gas Jars—

3	4	5	6	7 in. diam.
4d.	6d.	8d.	9d.	1/ each

731 **Gas Bladders**, Prepared Gold Beaters' Skin ... ... each £0 1 6

732 ,, ,, ,, ,, ,, ,, with Ferrule ,, 0 2 3

733 ,, ,, Bullock's, cleaned, without Ferrule ... ,, 0 1 6

734 ,, ,, Sheep, for Explosion with mixed gases ,, 0 1 0



735



736



737

735 **Gas Deflagrating Jars,** or Bottles, thin glass, closed at bottom—

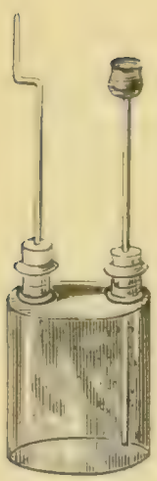
Capacity 20	24	32	48	64	80 oz.
8d.	10d.	1/	1/3	1/9	2/3 each

736 **Gas Deflagrating Globes,** for Burning Phosphorus in Oxygen—

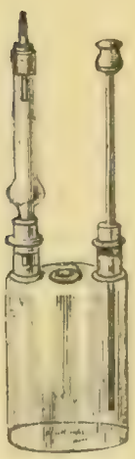
8	10	12 in. diam.
3/	3/9	4/6 each

737 **Gas Deflagrating Shades,** with Knob at top, open at bottom—

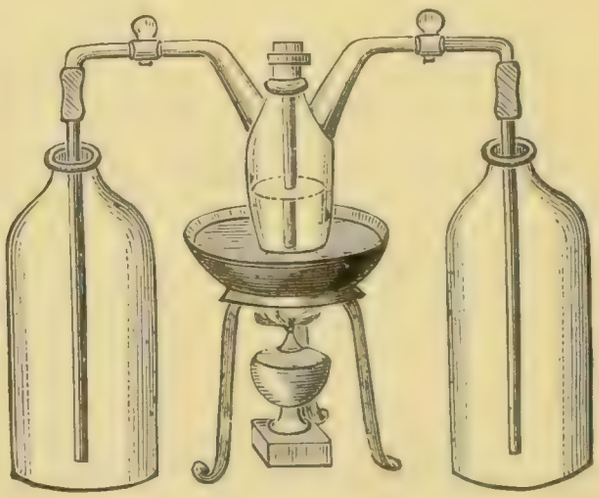
Capacity 20	30	40 oz.
1/	1/3	1/6 each



779



780

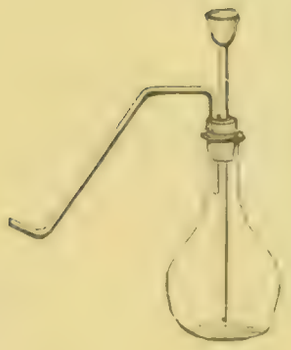


781

779 **Gas Generating Bottle,** 24 oz., with Safety Funnel and bent Tube £0 2 0

780 ,, ,, ,, 24 oz., with Safety Funnel, Drying Tube and Jet 0 2 0

781 **Zenetti's Chlorine Apparatus,** with Spirit Lamp, Copper Sand Dish, and Stand, complete 0 18 0



781A



781B

781A **Gas Flask**, fitted with Cork, Bent Glass Tube, and Thistle Funnel for Hydrogen, Chlorine, &c.

Capacity of Flask	16	24	32	48 oz.
	1/3	1/6	1/9	2/ each

781B **Gas Flask,** with Leading Tube for Oxygen, Laughing Gas, &c.—

Capacity of Flask	8	16	24	32 oz.
	10d.	1/	1/3	1/6 each

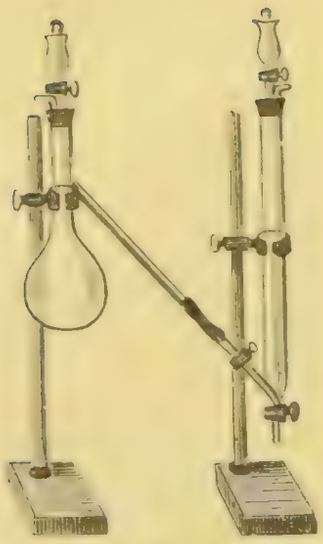


783

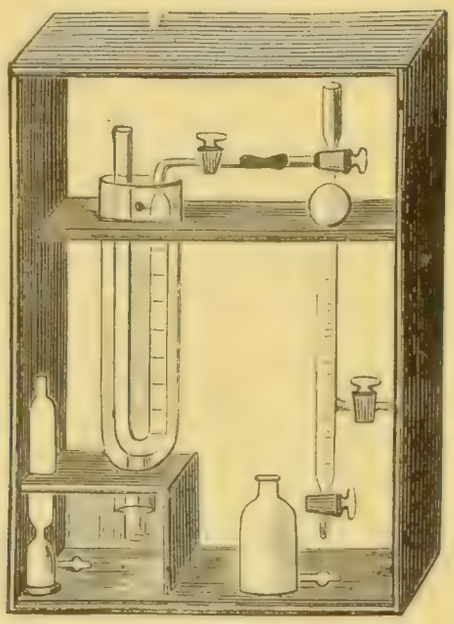


785

782	**Gas Deflagrating Spoon**	per doz. 4/6, each	£0	0	5
783	,, ,, ,, with Brass Cap	,, 8/6 ,,	0	0	9
784	,, ,, ,, ,, ,, ground ...	,,	0	2	6
785	,, ,, ,, ..Polished Brass, on Stand ...	,,	0	1	6
786	**Cedar Splints**	per bundle	0	0	6



738



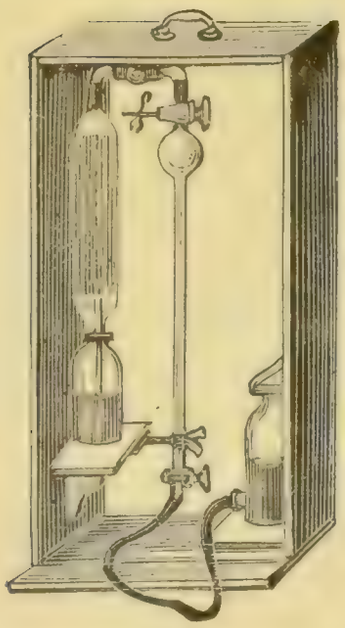
740

738 **Ledebur's Apparatus,** to determine Sulphur by Bromine, 2 Bulbs with Stopcocks, filled with Glass Beads, Flasks with I. R. Corks and side Tubes, about 250 c.c. capacity, Cylinder with Stopcock £0 18 0

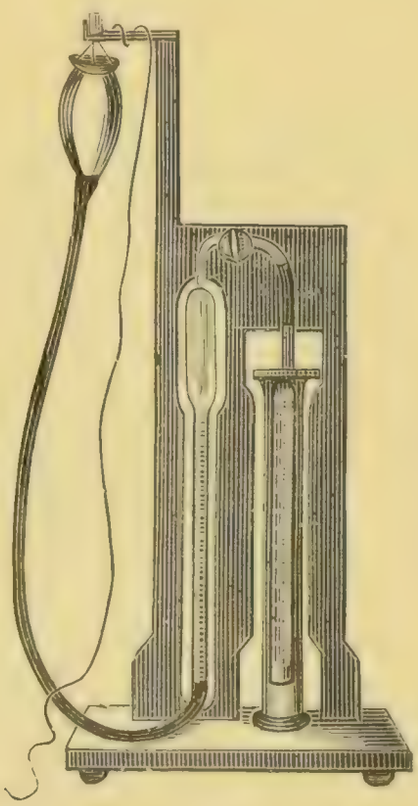
739 **Two Stands,** with Clamps for ditto 0 10 0

740 **Allen's Gas Analysis Apparatus,** complete in Wood Case... 2 5 0

Glass Parts only 1 10 0



741



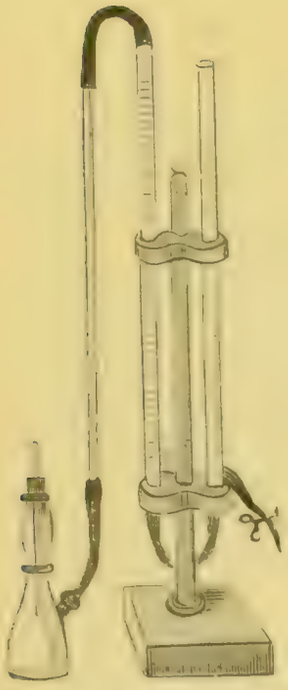
742

741 **Zindermann's Apparatus,** modified by Winkler, for estimation of Carbonic Acid, complete in Wood Case £2 0 0

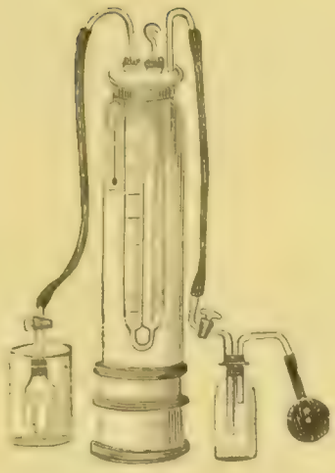
Glass Parts only 1 5 0

742 Ditto ditto on Stand, for estimation of Sulphurous Acid ... 2 0 0

Glass Parts only 1 0 0



743



744



745



745A

743 **Knopp's Ammoniometer,** with Stand... ... ... £0 15 0

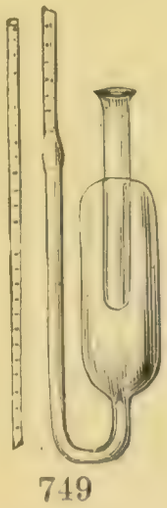
744 „ „ modified by Wagner 2 10 0

745 **Schiff's** „ 0 10 0

745A **Thorne's** „ for direct Analysis of Lost Gases in Water... ... ... 0 14 0



748



749



750

748 **Calorimeter,** Bunsen's—

Small	Medium	Large size
2	2/6	3/ each

749 „ with Tube fixed at side graduated into millimetres—

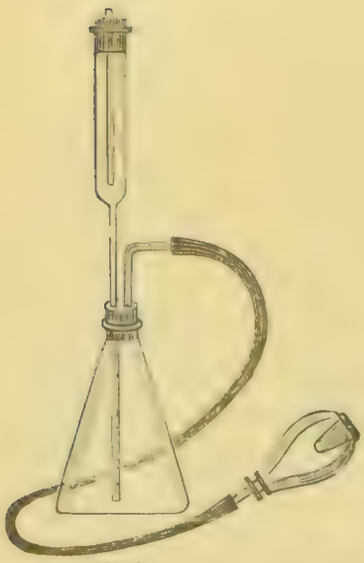
4/6	5/6	6/6 each

750 **Chancel's Apparatus,** to estimate the specific weight of Gases £0 10 0

750A **Auschutz & Schulzer's Flask,** for estimating Melting Points—

150	200	250	300	500 c.c.
2/	2/6	3/	3/6	4/ each

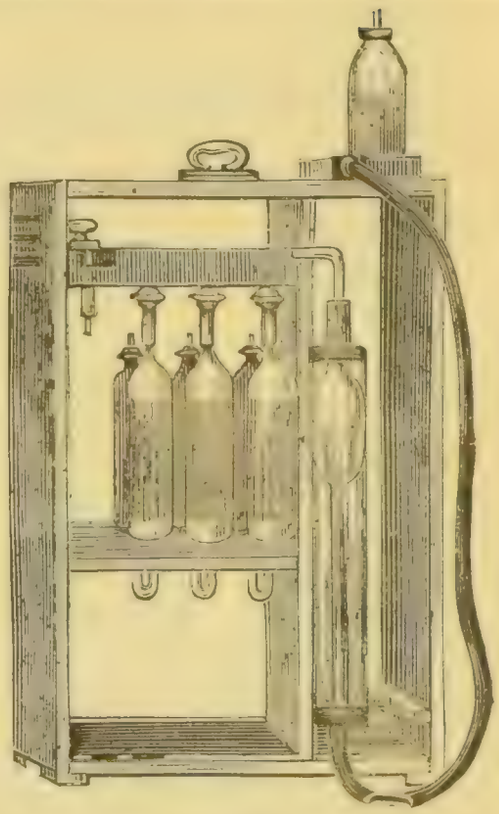
750B **Koninck's Hydrochloric Acid Apparatus** £0 12 0



751



752



753

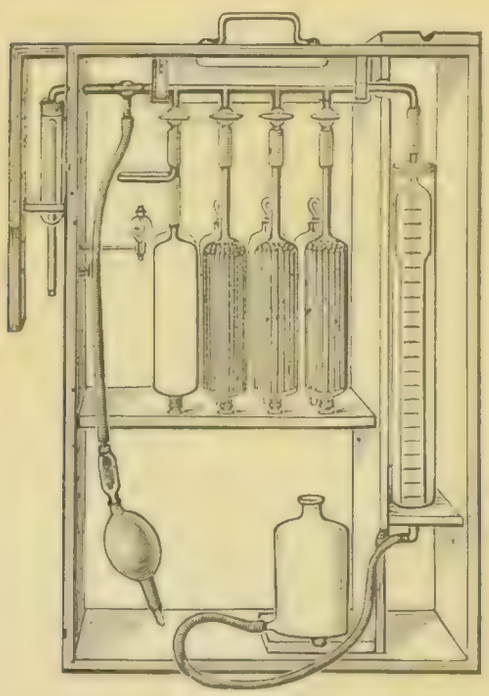
751 **Lunge's Gas Analysis Apparatus,** modified by Winkler, without India Rubber Ball £0 3 0

752 „ modified by Hesse 0 6 0

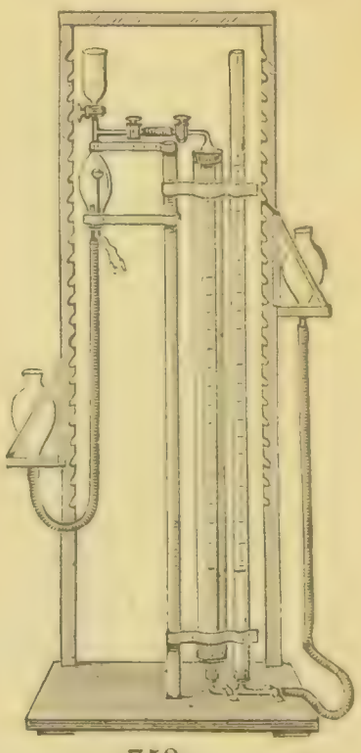
753 **Orsat Fisher's Gas Analysis Apparatus,** complete in Wood Case 3 0 0

Glass Parts only 2 10 0

Absorption Cylinders, filled ... ... each 0 4 0



753B



753C

753B **Orsat Lunge,** for Furnace Gas Analysis, with Palladium Tube, complete in case £4 0 0

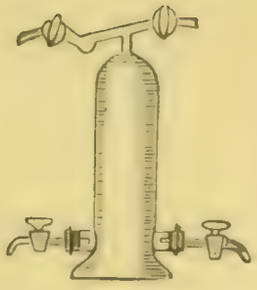
753C **Fisher's Apparatus,** for estimation of Generated Gas, Water Gas, &c., on Wooden Stand... ... ... 4 4 0



754



755



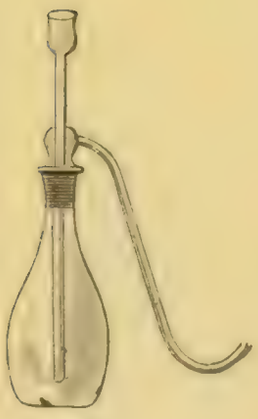
756

754 **Absorption Tubes,** Babo's, filled with Glass Beads £0 3 0

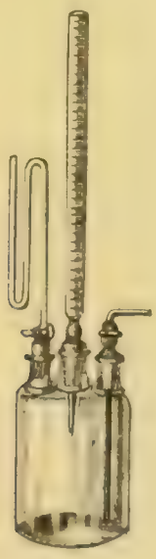
755 „ „ Emmerling's 0 4 0

756 **Stead's Gas Sample Apparatus,** with 4 Stopcocks... ... 0 16 0

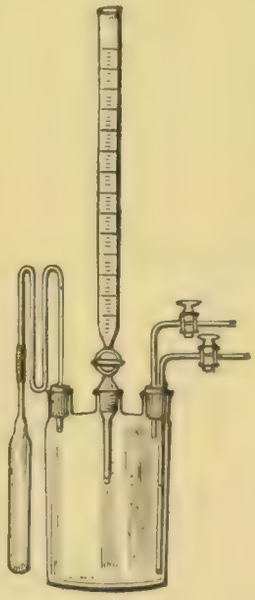
756A **McLeod's Gas Analysis Apparatus,** complete 26 0 0



757



757A



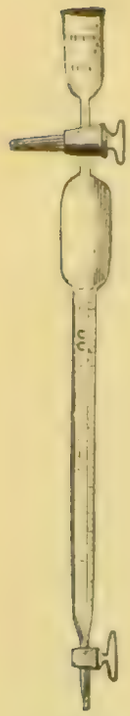
757B

757 **Gas Flask,** with bent Tube and Funnel in one piece ground into Neck—

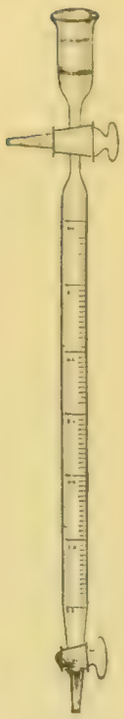
¼	½	1 litre
2/	3/	4/ each

757A **Rudorff's Apparatus,** for estimating Moisture in Coal Gas ... £1 1 0

757B **Oechselhauser** ditto 1 0 0



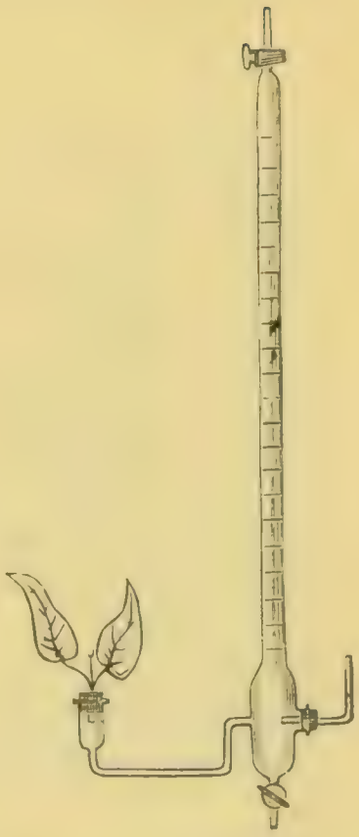
758



758A



759



760

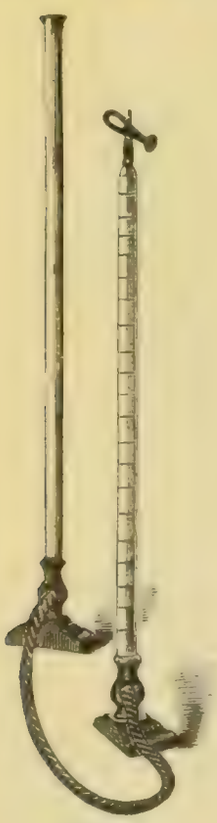
758 **Bunte's Gas Burette,** for Analysis of Furnace Gases—
Graduated 15 to 0 and 0 to 45 c.c. in $\frac{1}{5}$ths ... £0 14 0

758A ,, 10 to 0 and 100 c.c. in $\frac{1}{5}$ths 0 14 0

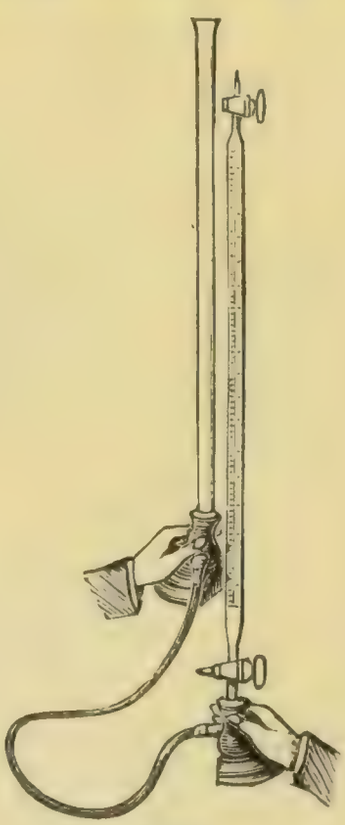
758B ,, with Greiner & Friedrich's Patent Stopcock ... 0 18 0

759 **Honigmann's Gas Burette,** 100 c.c. in $\frac{1}{5}$ths, with Cylinder... 0 8 0

760 **Moll's Apparatus,** to measure the Aspiration of Plants ... 0 12 0



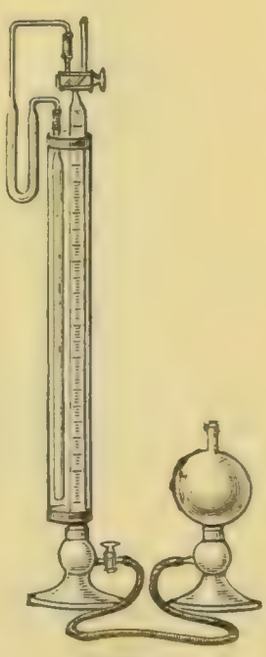
761



762



762A



762B

761 **Gas Burette,** Winkler-Hempel, graduated 100 c.c. in $\frac{1}{5}$ths, on Wood Foot, with pressure tubing ... £0 12 0

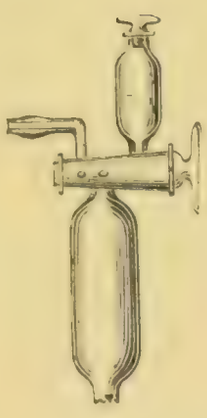
762 „ „ „ with Stopcocks 0 18 0

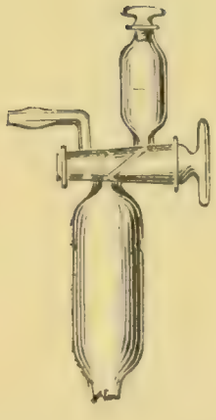
762A „ „ with Greiner & Friedrich's Patent Stopcock ... 1 0 0

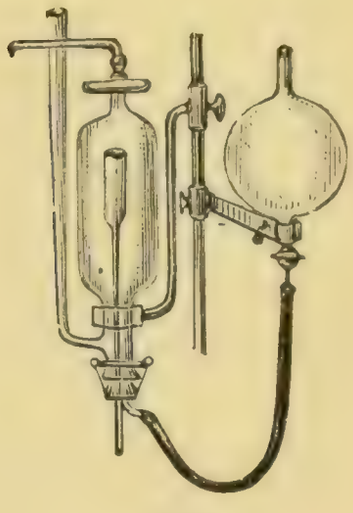
762B „ „ Hempel's Improved form, not affected by change of temperature or atmospheric pressure, with Patent Stopcock 1 5 0



763







764

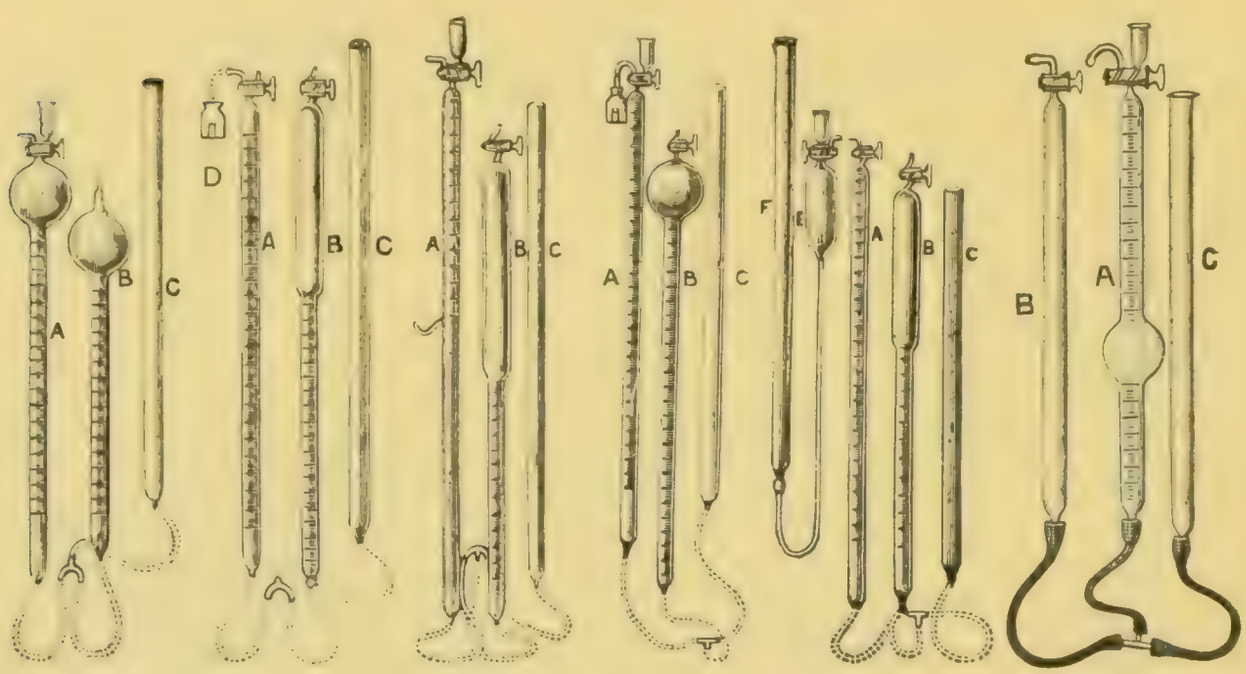
763 **Improved Gas Burette**– The New Gas Burette resembles the Bunte's Burette in reference to general construction but avoids the deficiencies of same, consisting in the application of the Stopcocks, especially the 3-way Stopcock of old pattern. The new Burette is provided with the New Patent Stopcocks with Oblique Borings, which secure the closure and facilitate exact work. The drawings show the peculiar construction of the Burette and the various turnings of the Stoppers £0 15 0

764 **Hempel's Apparatus,** for testing Dynamite and Saltpetre ... 0 12 0

(Stands extra.)

LUNGE'S IMPROVED GASVOLUMETERS.

These improvements make these instruments independent of temperature, and enable the operator to read off the volume of gas at once. They are carefully made and fitted with Greiner & Friedrich's Patent Stopcocks.



764A 764B 764C 764D 764E 764F

764A **Lunge's Apparatus,** for Determination of Saltpetre and other Soluble Salts—

Gas Measuring Tube A ...	100 to 140 c.c.	...	£0	13 0
Reduction Tube B divd.	100 to 130 c.c.	...	0	5 0
Glass Pressure Tube C ...	... ...	...	0	1 0
Complete with Stout India Rubber Pressure Tube		...	1	4 0

764B **Lunge's Apparatus,** for Analysis of Manganese, Chloride Lime, &c.—

Gas Measuring Tube A ...	100 c.c. in $\frac{1}{5}$ths	...	£0	10 6
Do. do. ...	50 c.c. in $\frac{1}{10}$ths	...	0	10 6
Reduction Tube B divd.	100 to 130 c.c.	...	0	8 0
Glass Pressure Tube C ...	... ...	...	0	1 0
Developing Flask D, with India Rubber Stopper		...	0	2 6
Complete with Stout India Rubber Tubing		... ...	1	15 0

764c **Lunge's Apparatus,** for determination of Nitrogen in Organic Elementary Analysis—

Gas Measuring Tube A ...	50 c.c. in $\frac{1}{10}$ths ...	£0	14	0
	In Mgr. Nitrogen	0	14	0
Reduction Tube B divd.	100 to 130 c.c. ...	0	8	0
Glass Pressure Tube C		0	1	0
Complete with Stout India Rubber Tubing		1	19	0

764d **Lunge's Apparatus,** for determination of heavy, and readily soluble substances, as Manganese, Chloride Lime, Calcium Phosphate, Calcium Carbonate, &c.—

Gas Measuring Tube A ...	50 c.c. in $\frac{1}{10}$ths ...	£0	13	0
Do. do. ...	100 c.c. in $\frac{1}{5}$ths ...	0	13	0
Reduction Tube B divd.	100 to 130 c.c. ...	0	8	0
Glass Pressure Tube C		0	1	0
Developing Flask D, with India Rubber Stopper ...		0	2	6
Complete with Stout Rubber Tubing		1	19	0

764e **Lunge's Apparatus,** for Analysis of Saltpetre, Nitrose, Nitro Cellulose, Dynamite—

Gas Measuring Tube A ...	100 c.c. in $\frac{1}{5}$ths ...	£0	9	0
Reduction Tube B ...	100 to 130 c.c. ...	0	8	0
Glass Pressure Tube C		0	1	0
Developing Flask E ...	100 c.c. (for Nitrose) ...	0	8	0
Do. do. ...	200 c.c. (for Dynamite and Saltpetre) ...	0	9	0
Glass Pressure Tube F		0	1	0
Complete with Stout India Rubber Tube		2	0	0

Apparatus, B C D E, provided with Reduction Tube without Stopcock, as in Fig. A, closed by melting off points. Complete Apparatus, 3 less.

764f **Universal Gasvolumeter**—

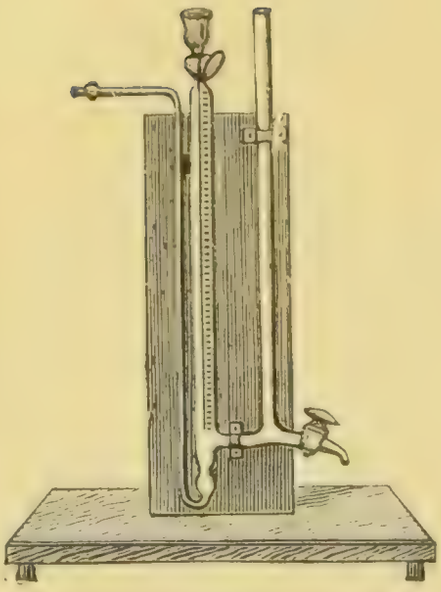
Gas Measuring Tube A ...	100 c.c. in $\frac{1}{5}$ths ...	£0	13	0
Reduction Tube B ...	100 c.c. in $\frac{1}{5}$ths ..	0	8	0
Glass Pressure Tube C		0	1	0
Complete with Stout Rubber Tubing		1	4	0

764g **Stand, Brass Rod,** on Iron Foot, with 2 Clamps 0 8 6

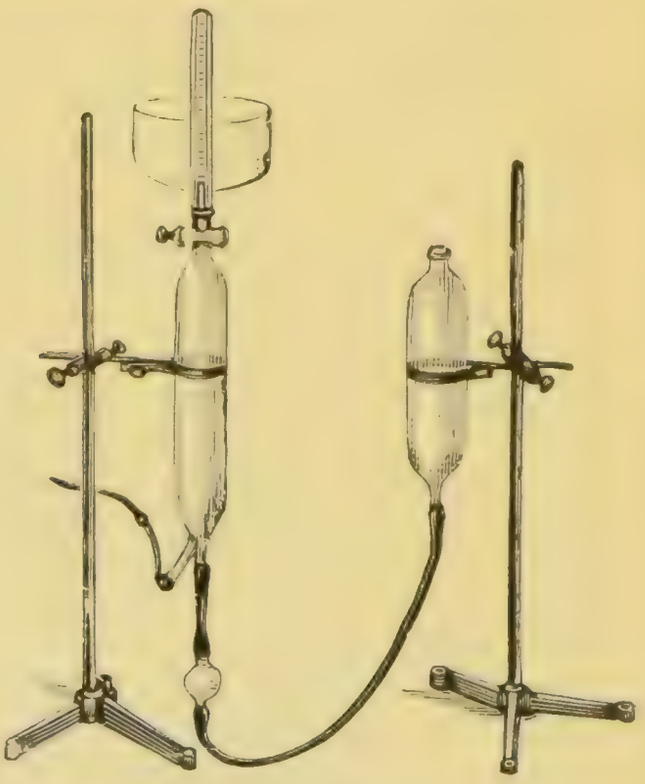
" " " " 3 " 0 11 6



1108

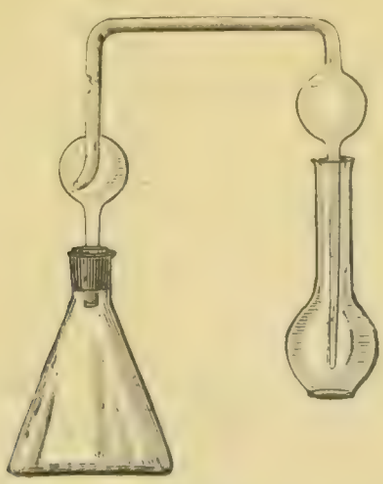


1111



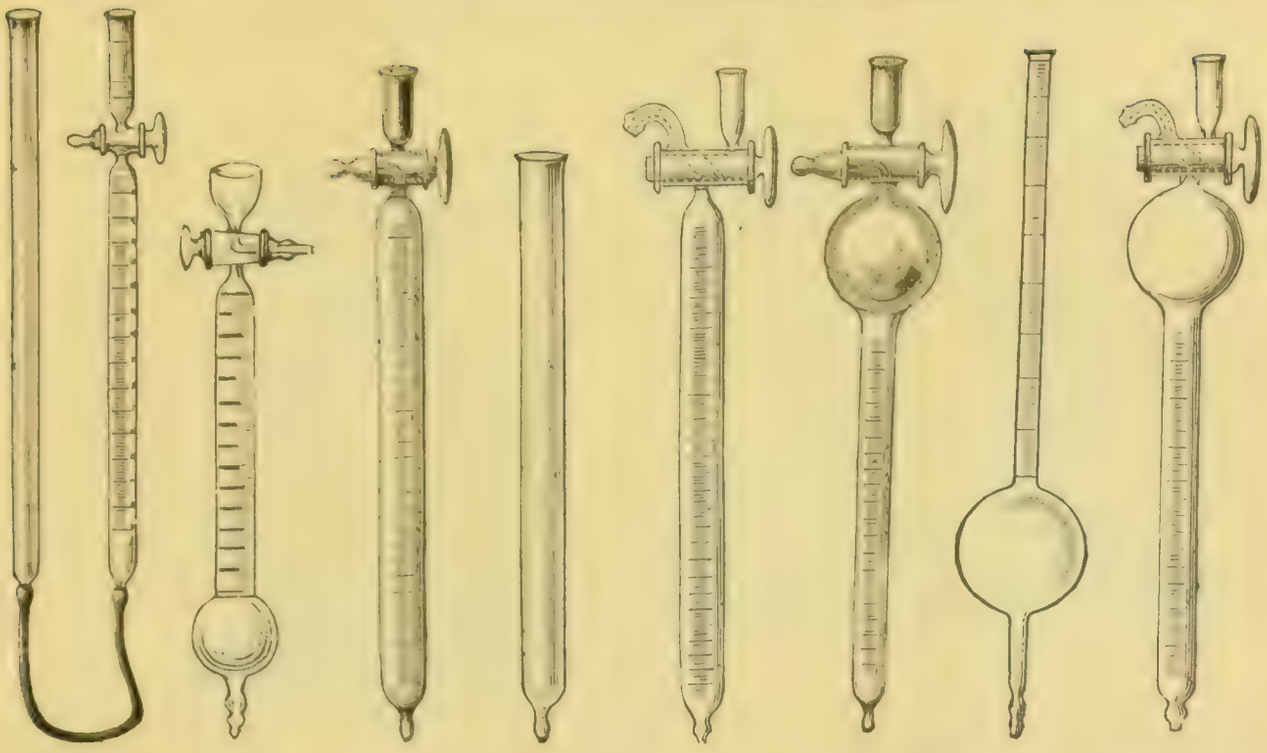
1113

1108	**Nitrogen Tubes,** with Stopcock, Crum's	£0	3	0
1109	„ Graduated, 30 c.c. in $\frac{1}{5}$ths	0	4	0
1110	„ „ 50 c.c. in $\frac{1}{5}$ths	0	5	6
1111	**Schwarz's Apparatus,** for determination of Nitrogen, graduated 80 c.c. in single divisions, on Wood Stand ...	0	15	0
1113	**Staedel's Apparatus,** for collection of Nitrogen, glass parts only	0	14	0
1114	Stand with Clamp... ... ... each	0	6	0



1114A

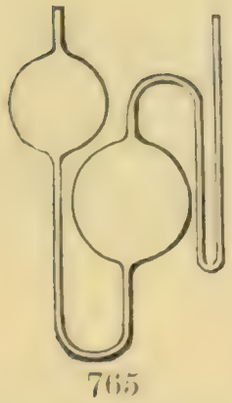
1114A	**Kjeldahl's Apparatus,** fitted with Rubber Cork	£0	4	6



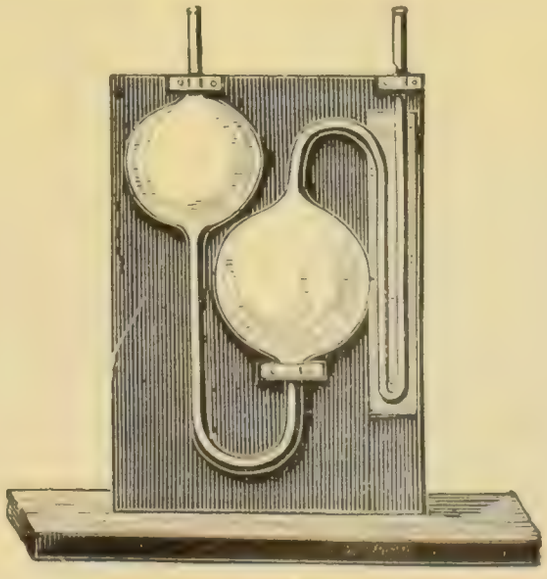
1115 1116 1118 1118A 1120 1120A

1115	**Nitrometer,** Allen's, graduated 50 c.c. in $\frac{1}{5}$ths, with Plain Tube	£0	7	6
1115A	,, ,, with Patent Stopcock	0	10	6
1116	,, Tennant Brady's— 30 50 100 c.c. in $\frac{1}{5}$ths			
	7/ 8/ 9/			
1118	,, Lunge's, 50 c.c. in $\frac{1}{5}$ths, with Plain Tube ...	£0	7	6
1118A	,, ,, with Patent Stopcock	0	10	0
1120	,, ,, for estimation of Saltpetre, with Bulb 100 c.c. capacity and graduated 100 to 150 c.c.	0	13	0
1120A	,, Same as above, with Patent Stopcock	0	16	0

Iron Stand, with 2 Brass Clamps, for any of the above Nitrometers, 8/6

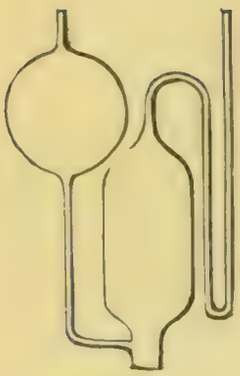


765

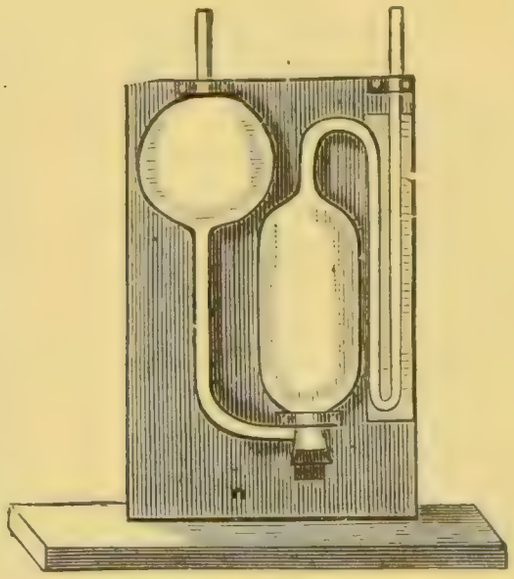


766

765	**Absorption Pipette,** Hempel's	£0	2	6
766	,, ,, on Black Wood Stand	0	5	0



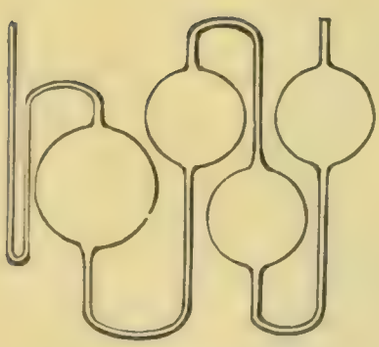
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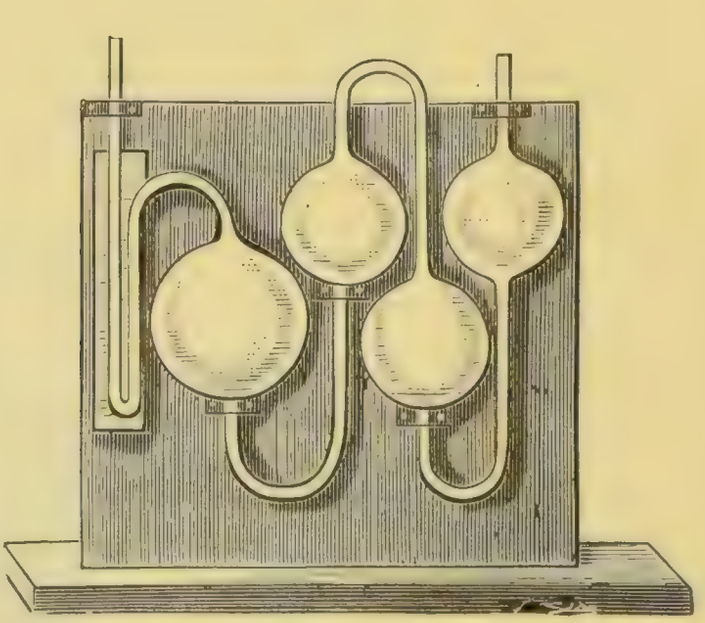
768

767 **Absorption Pipette,** Hempel's, for Strong Substances ... £0 2 6

768 „ „ with Stand 0 5 6



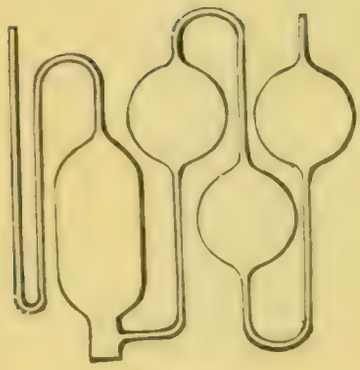
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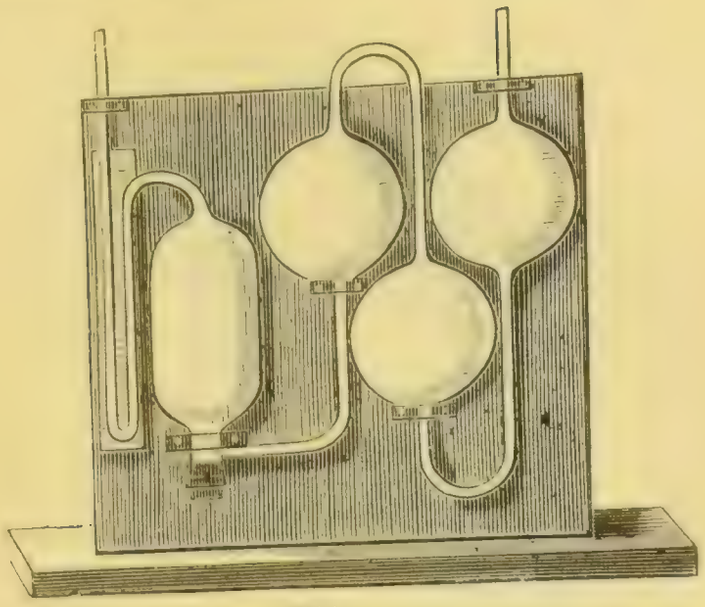
771

770 **Absorption Pipette,** Hempel's, 4 Bulbs £0 4 0

771 „ „ with Stand 0 7 6



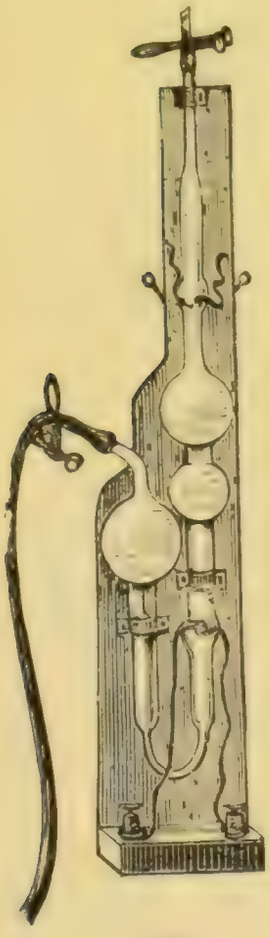
772



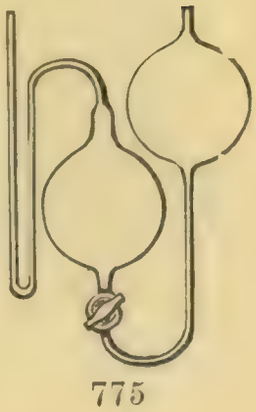
773

772 **Absorption Pipette,** for Strong Substances £0 4 0

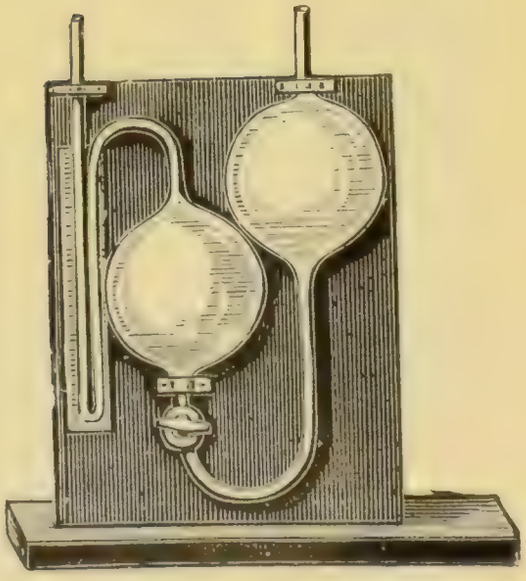
773 „ „ „ „ with Stand ... 0 8 0



774



775

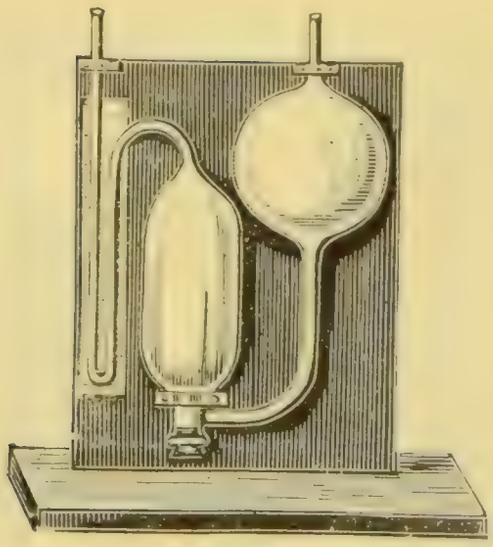


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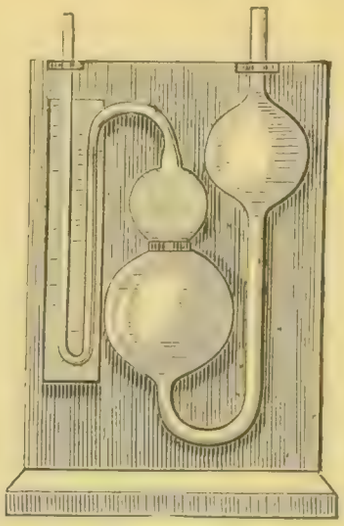
774 **Explosion Pipette,** Hempel's, with Stand £0 12 6

775 **Hydrogen Pipette,** with Stopcock 0 6 6

776 „ „ with Stopcock and Stand ... 0 9 0

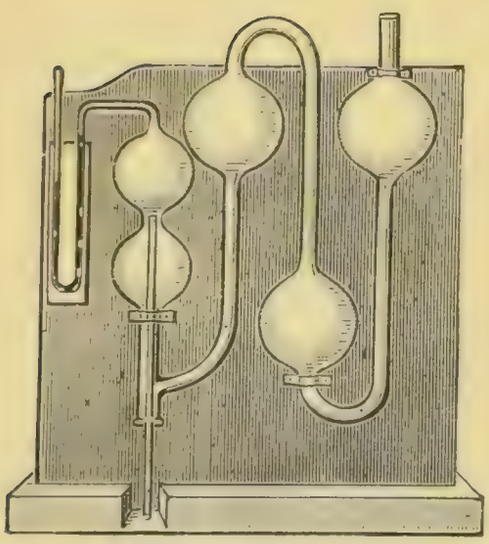


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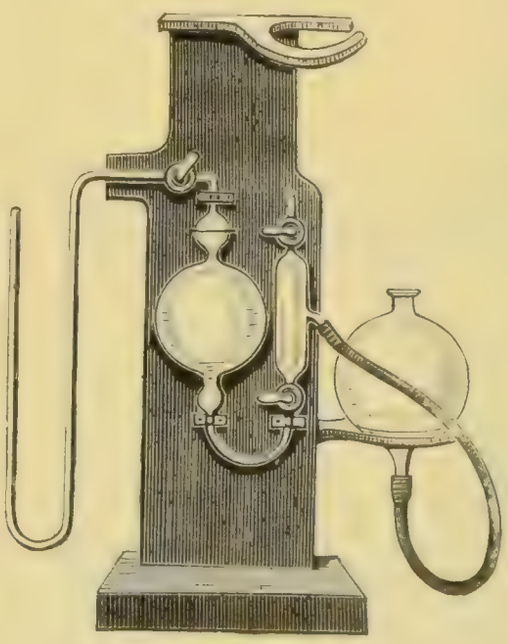


778

777	**Hydrogen Pipette,** with Stand	£0	5	6
778	**Absorption** ,, filled with Glass Beads, on Stand ...	0	6	6
	,, ,, without Stand	0	3	0



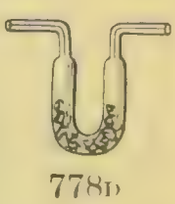
778A



778B

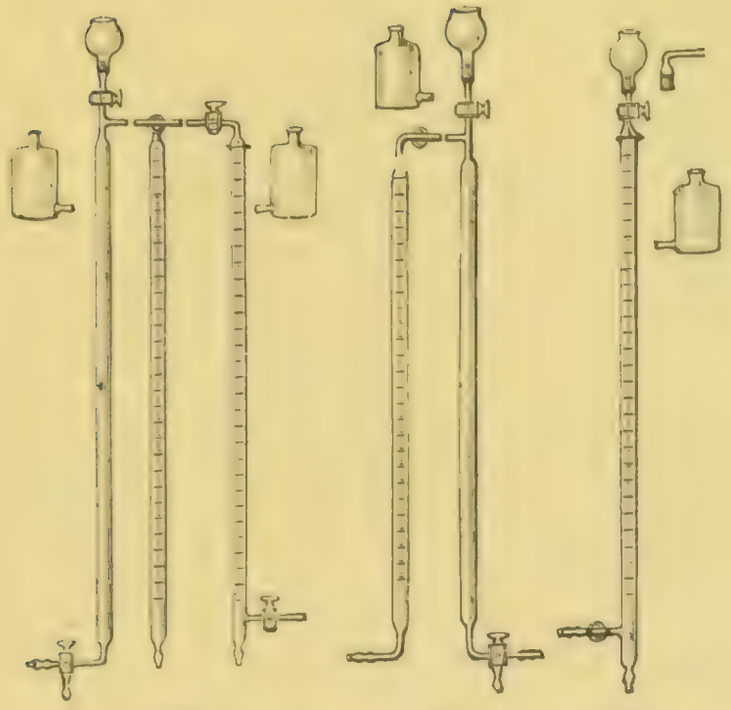


778C

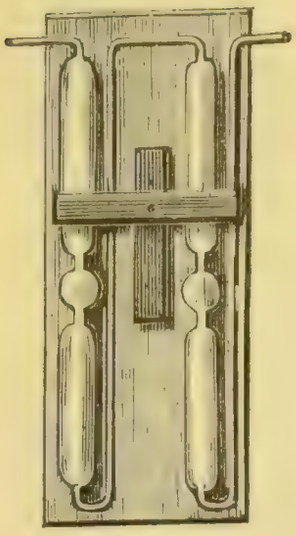


778D

778A	**Hydrogen Pipette,** mounted on Stand	£0	9	6
778B	**Gas Pipette, Bunge's,** mounted on Stand	1	0	0
778C	**Measuring Bulbs,** for Absorption Pipettes ... each	0	2	0
778D	**Palladium Tubes,** filled ... ... ,,	1	0	0



792 792A 792B



794

792 **Apparatus** for Rapid Analysis of Furnace Gases, complete with Explosion Pipette, as described by Mr. A. H. Elliot, *Chemical News*, Oct. 19, 1883 ... ... £2 0 0

792A Another form 1 4 0

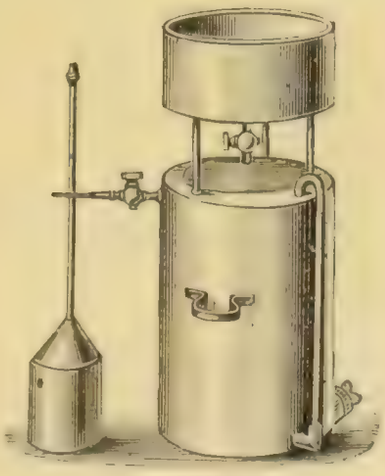
792B **Explosion Pipette,** for above 0 15 0

793 **Bulbs, Todd's,** used with Aspirator for Testing Flue Gas, each 0 1 6

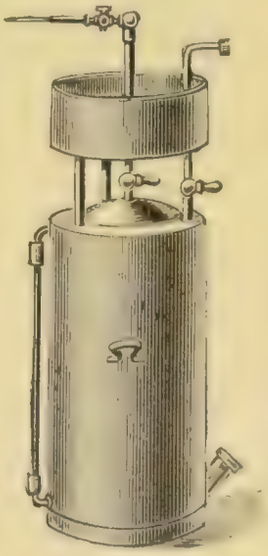
794 ,, .. Two Bulbs, fitted to Mahogany Frame ,, 0 5 0



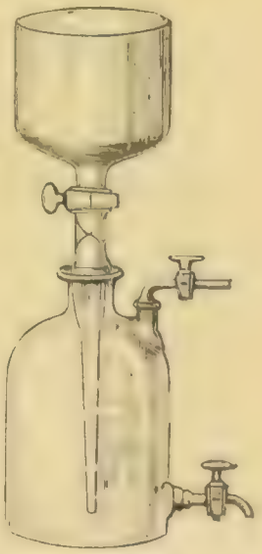
795



797



798A



799

795 **Gas Bottle,** Wanklyn's, with Cap, 100 oz. capacity to the Neck, as recommended in "Wanklyn's Gas Engineer's Manual" £0 5 0

797 **Gas Holders,** Stout Japanned Zinc, Pepys', with Funnel, Gauge and Stopcocks—

Capacity	2	4	6	8 gallons
	25/	30/	38/	50/ each

798 ,, Stout Copper, Japanned, Pepys', with Gauge and Stopcock—

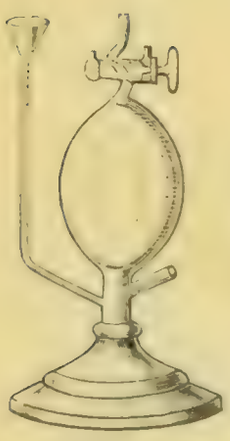
Capacity	2	4	6	8 gallons
	40/	50/	70/	90/ each

798A ,, with moveable Gas Jet in centre of trough, and union for connection with water supply—

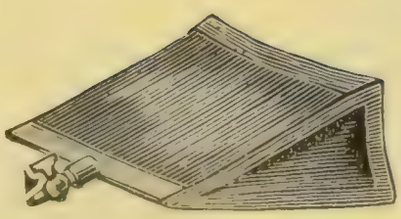
Japanned Zinc, 6 gallons £2 5 0
Stout Copper ,, ... 3 15 0

799 **Glass Gas Holder,** with Glass Stopcocks, ground in, capacity 1 gallon £1 4 0

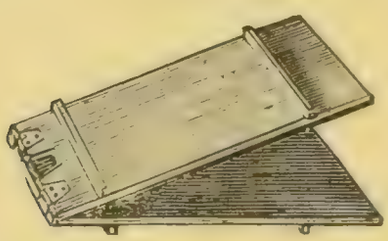
,, ,, ,, ,, 2 gallons 1 10 0



799A



801



802

799A **Gasometer,** Ehrenberg's, with Stopcock, on Stand ... £1 8 0

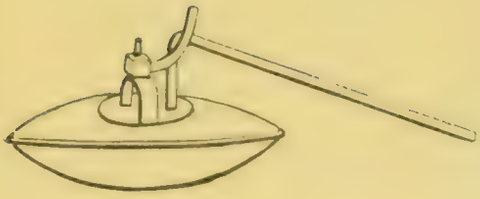
809 **Gas Bags,** Vulcanized Rubber, with Ferrule, Cushion Shape, 19 by 17 in., each 0 12 6

801 ,, ,, Wedge Shape, with Ferrule—

Length.	Width.	Height at End.		
20 inches	12 inches	12 inches	each	£1 5 0
24 ,,	20 ,,	18 ,,	,,	2 2 6
30 ,,	20 ,,	20 ,,	,,	2 15 0

Stopcock with Jet, 2/6 extra.

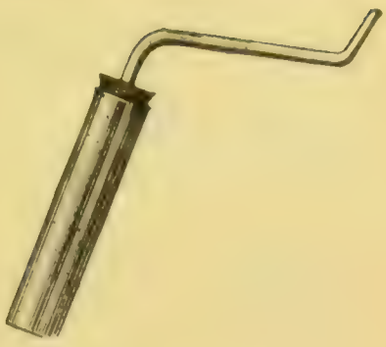
802 **Pressure Boards,** for Gas Bags ... ... per pair 0 12 6



806



807



809

806	**Gas Retort,** Sheet Iron, for Chlorate of Potash and Manganese, top to be luted with Stourbridge Clay ... each	£0	4 6
807	,, Conical form ... ... ,,	0	7 6
808	,, ,, with Copper Bottom ... ,,	0	8 6
809	,, Copper Tube for small quantities, fitted with Cork and Glass Leading Tube ... ... each	0	2 6
	(See also "Retorts, Iron.")		
810	**Glass Tubing,** free from Lead, for Bending and Connecting Apparatus, Leading Tubes, &c., diam. outside $\frac{3}{16}$ in. to $\frac{3}{4}$ in., and in lengths of about 3 ft. ... ... per lb.	0	1 0
	In quantities of 28 lbs. ,,	0	0 10
811	**Glass Tubing,** fine Quill, $\frac{1}{8}$ in. diameter outside... ... ,,	0	1 6
812	,, ,, Large diameter, 1 in. to $1\frac{1}{4}$ in.... ... ,,	0	1 4
	,, ,, ,, ,, $1\frac{1}{2}$ in. ,, $1\frac{3}{4}$ in.. ... ,,	0	1 9
	,, ,, ,, ,, 2 in. ,, $2\frac{1}{4}$ in.... ... ,,	0	2 0
813	**Glass Tube,** Stout, for Steam Gauges ... ... ,,	0	1 6
814	,, ,, ,, cut in lengths—		

10	12	14	16	18 in. long	
4/	5/	6/	7/	8/ per doz.,	diam, $\frac{5}{8}$ in.
4/6	6/	7/	8/	9/ ,, ,,	$\frac{3}{4}$ in.

815	,, ,, Barometer ... ... per lb.	0	1 6
816	,, ,, Thermometer ... ... ,,	0	2 0
817	,, ,, Hardest Bohemian Potash Glass for Combustion ,,	0	1 4
818	,, ,, ,, Quill, for Blowpipe use, $\frac{3}{16}$ in. to $\frac{5}{16}$ in. diam. outside, per lb.	0	1 8
818A	,, ,, Hard Glass, thin white Spindle, $\frac{1}{4}$ in. diameter ,,	0	2 6
819	**Glass Rods,** German Glass, for Stirrers, $\frac{1}{8}$ in. to 1 in. diameter ... ... per lb.	0	1 0
	28 lbs. ,,	0	0 10
820	,, ,, Coloured ... ... ,,	0	1 6
821	,, ,, White Opaque ... ... ,,	0	1 6

Glass Plates, Ground. *(See "Covers.")*

GRADUATED INSTRUMENTS.

Carefully divided into Equal Parts for use as Test Measures or Quantitative Operations, also Flasks and Pipettes, Gauged to deliver precise quantities.



822



826



827



830

822 **Bink's Burettes, or Alkalimeters,** with Wooden Foot—

25	50	50	cubic centimetres
250	250	500	divisions
2/6	3/6	4/	each

823 **Bink's Burettes, or Alkalimeters,** with Wooden Foot—

250	500	1,000	1,000	grains
250	100	100	200	divisions
2/6	3/	3/6	4/	each

825 ,, ,, On Glass Foot, for Estimation of Ammonia in Gas Liquor, 2 oz., divided into 32 parts... £0 3 6

826 **Faraday's Alkalimeter,** 1,000 grains, Graduated into

100	divisions,	each	0	2 0
200	,,	,,	0	3 0

827 **Gay Lussac's Burette—**

1,000 grains,	Graduated into	100	divisions	,,	0 3 6
50 c.c.	,,	250	,,	,,	0 4 0
50 c.c.	,,	500	,,	,,	0 4 6

830 **Eggertz's Carbon Tubes,** with two Plain Tubes, same dimensions—

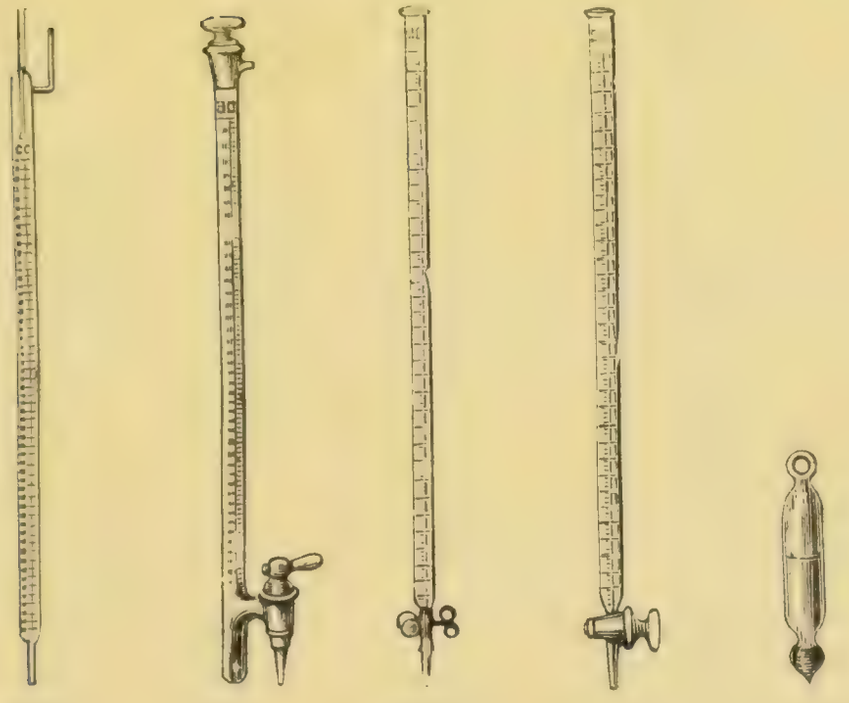
10	20	30	c.c.
100	200	300	divisions
2/3	2/6	3/	per set

832 **Carbon Tubes,** Tubes only Graduated—

10	20	30 c.c.
100	200	300 divisions
1/6	1/9	2/ each

835 ,, 200 grains, into 200 divisions, with two Plain Tubes, same dimensions ... ... the set £0 3 0

836 ,, Only Graduated 200 grains, in 200 divisions, each 0 2 0



838 839 840 844 848

838 **Rammelsberg's Burette,** with Side Tube, 50 c.c. into $\frac{1}{5}$ths, each £0 5 0

839 **Geissler's Burette,** with Stopcock, Stoppered at the top, and Cavity at the side, for volatile solutions, &c.—

50	Cubic Cent.,	Graduated into	$\frac{1}{5}$	each	0 7 0
50	,,	,,	$\frac{1}{10}$	,,	0 7 6
100	,,	,,	$\frac{1}{1}$	,,	0 8 0
100	,,	,,	$\frac{1}{2}$	,,	0 8 6
100	,,	,,	$\frac{1}{5}$	,,	0 9 0

840 **Mohr's Burette,** with Pinchcock, Caoutchouc Tube, and Glass Jet—

100 grains,	Graduated into	100	Divisions	...	each	£0	1	9
250	,,	250	,,	...	,,	0	2	0
500	,,	100	,,	...	,,	0	2	6
500	,,	250	,,	...	,,	0	3	0
1,000	,,	100	,,	...	,,	0	3	6
1,000	,,	200	,,	...	,,	0	3	9
1,500	,,	150	,,	...	,,	0	4	6
1,500	,,	300	,,	...	,,	0	5	6

841 **Mohr's Burettes,** Cubic Centimetres, with Pinchcock, Glass Jet, &c.—

10	Graduated into	$\frac{1}{10}$	Divisions	...	each	£0	1	6
20	,,	$\frac{1}{5}$	,,	...	,,	0	1	9
20	,,	$\frac{1}{10}$	,,	...	,,	0	2	0
25	,,	$\frac{1}{5}$	,,	...	,,	0	2	0
25	,,	$\frac{1}{10}$	,,	...	,,	0	2	3
30	,,	$\frac{1}{10}$	,,	...	,,	0	2	6
50	,,	$\frac{1}{2}$	,,	...	,,	0	3	0
50	,,	$\frac{1}{5}$	,,	...	,,	0	3	0
50	,,	$\frac{1}{10}$	,,	...	,,	0	3	6
55	,,	$\frac{1}{5}$	,,	...	,,	0	4	0
55	,,	$\frac{1}{10}$	,,	...	,,	0	4	3
60	,,	$\frac{1}{5}$	,,	...	,,	0	3	9
60	,,	$\frac{1}{10}$	,,	...	,,	0	4	6
75	,,	$\frac{1}{5}$	,,	...	,,	0	4	6
100	,,	$\frac{1}{1}$	,,	...	,,	0	3	9
100	,,	$\frac{1}{2}$	,,	...	,,	0	4	0
100	,,	$\frac{1}{5}$	,,	...	,,	0	5	0
100	,,	$\frac{1}{10}$	,,	...	,,	0	6	0

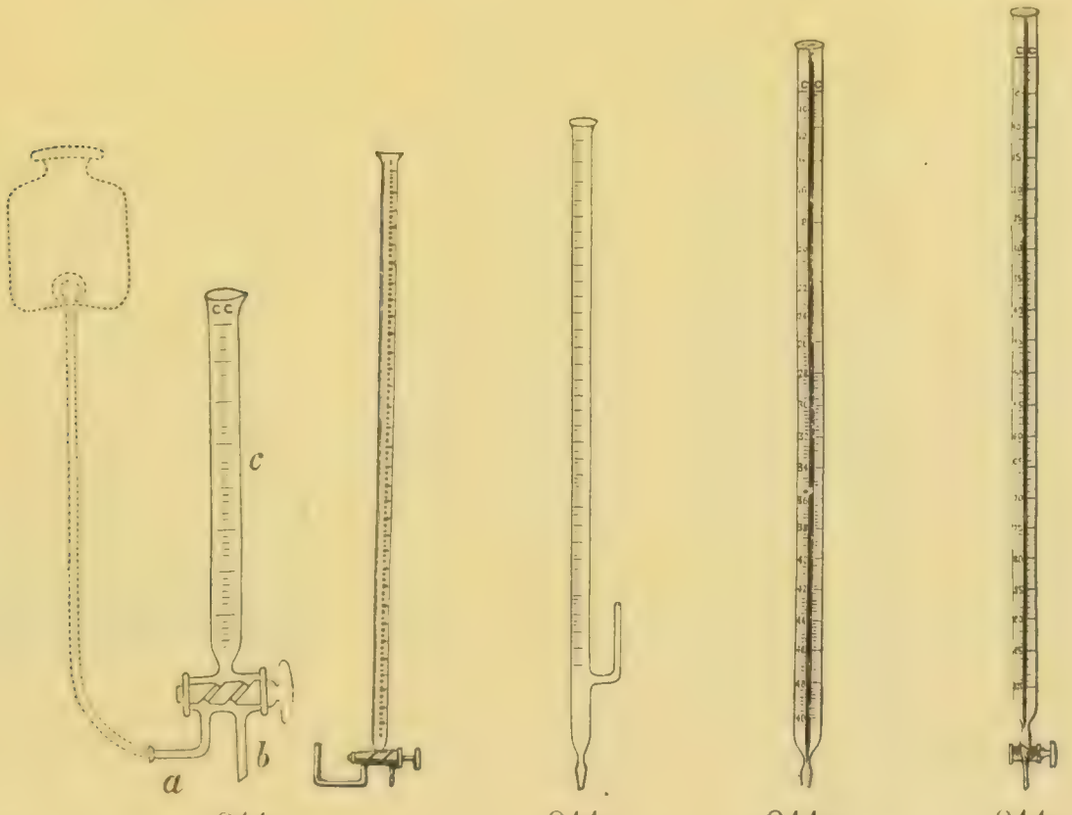
842 ,, 100 decems., with Pinchcock and Jet, 200 divisions ... ... each 0 4 3

843 **Mohr's Burettes,** 100 septems, 100 divisions ... each 0 3 3

,,	,,	100	,,	200	,,	...	,,	0	3	9
,,	,,	100	,,	500	,,	...	,,	0	5	0
,,	,,	100	,,	100	,,	with Stopcock	,,	0	4	6
,,	,,	100	,,	500	,,	,,	,,	0	6	0

844 **Mohr's Burettes, with Geissler's Glass Stopcock—**

10	cubic centimetres	graduated into	$\frac{1}{10}$	Divisions,	each	£0	3	0
20	,,	,,	$\frac{1}{10}$	,,	,,	0	3	6
25	,,	,,	$\frac{1}{5}$	,,	,,	0	3	6
25	,,	,,	$\frac{1}{10}$	,,	,,	0	3	9
30	,,	,,	$\frac{1}{10}$	,,	,,	0	4	3
50	,,	,,	$\frac{1}{5}$	,,	,,	0	4	3
50	,,	,,	$\frac{1}{10}$	,,	,,	0	4	9
55	,,	,,	$\frac{1}{10}$	,,	,,	0	5	6
60	,,	,,	$\frac{1}{10}$	,,	,,	0	5	6
100	,,	,,	$\frac{1}{2}$	,,	,,	0	5	0
100	,,	,,	$\frac{1}{5}$	,,	,,	0	5	6
100	,,	,,	$\frac{1}{10}$	,,	,,	0	7	0
200	,,	,,	$\frac{1}{1}$	,,	,,	0	6	0



844A 844B 844D 844E

844A **Burette, Greiner & Friedrich's Patent,** for filling. The diagram shows the mode of filling by means of India Rubber Tube attached to Burette at A, and by turning, can be drawn off at B, or when half turned the flow ceases either way. This Apparatus is specially adapted for Volumetric Analysis, taking samples, and adjusting measures to be graduated—

25	50	100 c.c. in $\frac{1}{10}$ths
6/	7/6	10/ each

844B & C **Mohr's Burettes,** with Side Tube for filling, made to order, with or without Stopcock, graduated into cubic centimetres or grains.
6d. each extra.

844D & E **Mohr's Burettes,** with enamelled Glass Scale, with or without Stopcock, 1/ each extra.

845 **Mohr's Burettes, with Geissler's Glass Stopcock—**

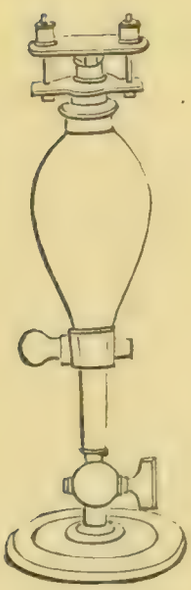
250 grains	graduated into	250	Divisions	...	...	each	£0	3 6
500	,,	250	,,	...	...	,,	0	4 6
1,000	,,	100	,,	...	...	,,	0	5 0
1,000	,,	200	,,	...	...	,,	0	5 6
1,500	,,	300	,,	...	..	,,	0	6 6

846 **Mohr's Burettes,** with Pinchcock and Glass Jet, for Gas Ammonia Estimations, 2 oz. into 32 parts 0 3 6

847 ,, ,, Stopcock ... ... each 0 5 0

848 **Erdmann's Floats,** for reading graduations ... ... ,, 0 0 8

849 ,, ,, ,, coloured glass ,, 0 0 10



850



851



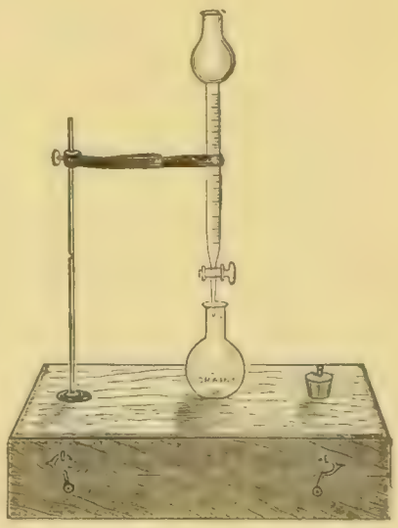
851A



853



855



856

850 **Eudiometer,** Cavendish's, on Mahogany Stand £1 10 0

851 ,, Bunsen's, graduated into millimetres—

300	400	500	600	800 mm. Linear
4/	4/3	4/9	5/3	6/6 each

851A ,, Mitscherlich's, graduated into c.c. 0 16 0

852 ,, Volta's, 50 c.c., 100 divisions 0 4 0

853 ,, Ure's, 1 cubic in. graduated into 100 parts, each 0 4 6

2 ,, ,, 200 ,, ,, 0 5 6

854 ,, ,, 25 cubic centimetres 50 ,, ,, 0 4 0

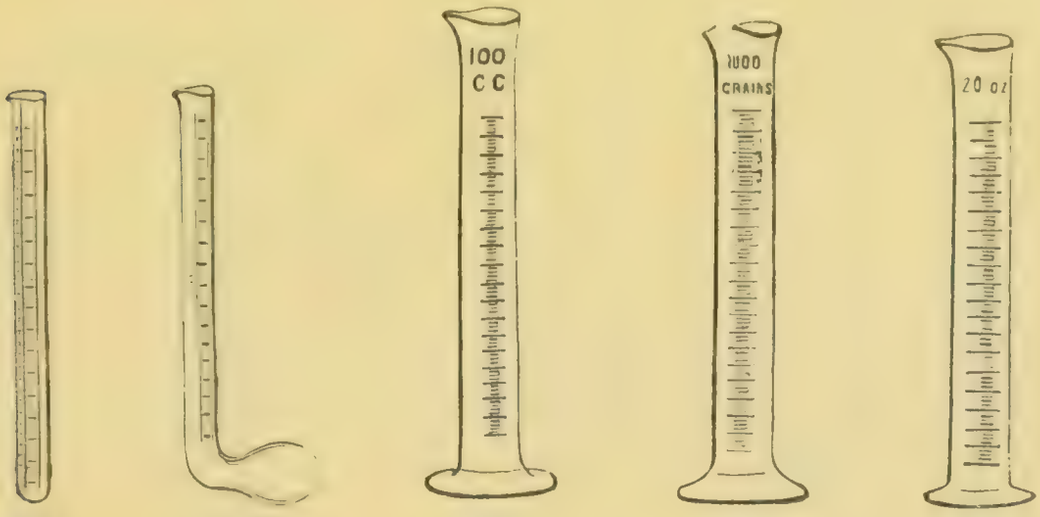
50 ,, 100 ,, ,, 0 5 0

Graduated Gas Jars (*See "Gas Jars," Fig.* 710).

855 **Graduated Gas Tubes,** sealed at one end—

	1 cubic inch divided into 100 parts				...	each	£0	1 3
5	cubic centimetres	graduated into	100	parts	...	,,	0	0 10
10	,,	,,	100	,,	...	,,	0	1 0
12	,,	,,	60	,,	...	,,	0	1 0
20	,,	,,	100	,,	...	,,	0	1 2
25	,,	,,	125	,,	...	,,	0	1 6
30	,,	,,	150	,,	...	,,	0	1 9
50	,,	,,	250	,,	...	,,	0	2 3
100	,,	,,	200	,,	...	,,	0	3 3
200	,,	,,	200	,,	...	,,	0	3 9
250	,,	,,	250	,,	...	,,	0	4 3

856 **Gravimeter,** Mann's, for the Estimation of Specific Gravity of Solid Bodies, Cements, &c., consisting of graduated Pipette with Stopcock, Flask and Stand complete, in Mahogany Box 1 1 0



857 858 860 861 862

857 **Bunsen's Absorption Tube,** about 250 millimetres long, and Graduated into millimetres—each £0 1 9

858 ,, ,, ,, with bulb ,, 0 2 0

859 **Bunte's Gas Burette,** for Analysis of Furnace Gases, graduated 15 to 0 and 0 to 45 in $\frac{1}{10}$th c.c. 0 14 0

100 c.c. in $\frac{1}{5}$ths 0 14 0

860 **Graduated Tubes or Test Measures on Glass Foot**

5	cubic centimetres		graduated into	100	parts	...	each	0 0 8
10	,,		,,	100	,,	...	,,	0 0 9
25	,,		,,	100	,,	...	,,	0 0 10
50	,,		,,	100	,,	...	,,	0 1 2
100	,,		,,	100	,,	...	,,	0 1 4
200	,,		,,	100	,,	...	,,	0 2 0
250	,,	or $\frac{1}{4}$ litre	,,	125	,,	...	,,	0 2 4
250	,,		,,	250	,,	...	,,	0 3 3
300	,,		,,	150	,,	...	,,	0 2 9
500	,,	or $\frac{1}{2}$ litre	,,	100	,,	...	,,	0 2 9
700	,,		,,	100	,,	...	,,	0 3 9
1,000	,,	or 1 litre	,,	100	,,	...	,,	0 5 0
2,000	,,	or 2 litres	,,	100	,,	...	,,	0 8 0

With Enamelled Backs, either size, 20 per cent. extra, to order.

861 **Graduated Test Measures on Glass Foot** (Grains)—

100	grains	graduated into	100	parts	...	each	£0	0 9
200	,,	,,	100	,,	...	,,	0	1 0
250	,,	,,	125	,,	...	,,	0	1 6
500	,,	,,	100	,,	...	,,	0	1 6
1,000	,,	,,	100	,,	...	,,	0	1 9
1,000	,,	,,	200	,,	...	,,	0	2 9
5,000	,,	,,	100	,,	...	,,	0	2 9
10,000	,,	,,	100	,,	...	,,	0	3 9

862 **Graduated Measures on Glass Foot** (Ounces)—

1	ounce	graduated into	100	parts	...	each	0	1 3
2	,,	,,	100	,,	...	,,	0	1 9
5	,,	,,	100	,,	...	,,	0	2 3
10	,,	,,	100	,,	...	,,	0	2 9
20	,,	,,	100	,,	...	,,	0	3 3



863



864

863 **Graduated and Stoppered Measures, Test Mixers,** on Glass Foot (cubic centimetres)—

10	cubic centimetres	graduated into	100	parts	...	each	£0	0 10
25	,,	,,	100	,,	...	,,	0	1 3
50	,,	,,	100	,,	...	,,	0	1 6
100	,,	,,	100	,,	...	,,	0	2 3
200	,,	,,	100	,,	...	,,	0	3 0
250	,,	or ¼ litre ,,	125	,,	...	,,	0	3 9
300	,,	,,	100	,,	...	,,	0	3 6
500	,,	or ½ litre ,,	100	,,	...	,,	0	4 3
600	,,	,,	120	,,	..	,,	0	5 0
1,000	,,	or 1 litre ,,	100	,,	...	,,	0	6 6
2,000	,,	or 2 litres ,,	100	,,	...	,,	0	10 6

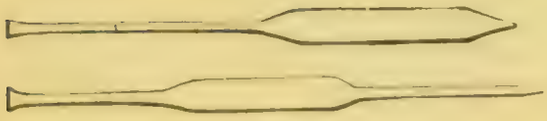
864 **Graduated and Stoppered Test Mixers** (Grains)—

500	grains	graduated into	100	parts	...	each	0	1 9
1,000	,,	,,	100	,,	...	,,	0	2 3
2,000	,,	,,	100	,,	...	,,	0	3 3
5,000	,,	,,	100	,,	...	,,	0	3 9
10,000	,,	,,	100	,,	...	,,	0	4 6

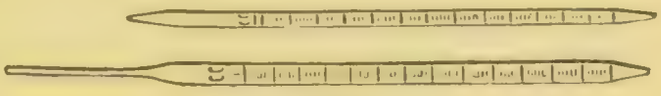
With Enamelled Backs, either size, 20 per cent. extra, to order.

865 **Graduated and Stoppered Test Mixers**

1	decigallon	100	divisions of	10	septems	...	each	£0	4	3
2	,,	100	,,	20	,,	...	,,	0	6	6
5	,,	100	,,	50	,,	...	,,	0	10	6



866



870

866 **Graduated Pipettes.** Cubic centimetres, gauged at one mark to deliver precise quantities—

1	2	5	10	15	20	25	30	50	70	100 cubic centimetres
3d.	4d.	5d.	6d.	7d.	8d.	9d.	9d.	10d.	11d.	1/ each

867 **Graduated Pipettes,** to deliver grains—

5	10	20	50	100	200	250	500	1,000 grains
3d.	3d.	3d.	4d.	6d.	8d.	9d.	10d.	1/ each

868 **Graduated Pipettes,** to deliver septems—

5	10	20	25	50	100 septems
6d.	7d.	8d.	9d.	1/	1/3 each

869 **Graduated Pipettes,** to deliver 1 cubic in. ... ... each £0 0 10

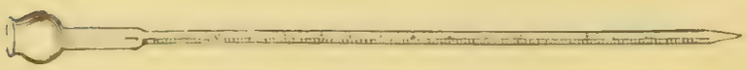
869A ,, ,, ,, 1 oz. ... ... ,, 0 0 10

870 **Graduated Scale Pipettes,** divided into parts—

1	cubic centimetre	graduated into	10	parts...	each	0	0	8
1	,,	,,	100	,, ...	,,	0	1	0
2	,,	,,	50	,, ...	,,	0	1	0
5	,,	,,	25	,, ...	,,	0	0	9
5	,,	,,	50	,, ...	..	0	1	0
10	,,	,,	50	,, ...	,,	0	1	0
10	,,	,,	100	,, ...	,,	0	1	2
20	,,	,,	100	,, ...	,,	0	1	6
25	,,	,,	50	,, ...	,,	0	1	6
25	,,	,,	125	,, ...	,,	0	2	0
50	,,	,,	100	,, ...	,,	0	2	6
50	,,	,,	250	,, ...	,,	0	3	6
100	,,	,,	200	,, ...	,,	0	4	0

871 **Graduated Scale Pipettes** (Grains), divided into parts—

10	grains	divided into	20	parts...	...	each	0	1	0
50	,,	,,	50	,, ...	...	,,	0	1	2
100	,,	,,	100	,, ...	...	,,	0	1	6
250	,,	,,	250	,, ...	...	,,	0	2	0
500	,,	,,	250	,, ...	...	,,	0	2	9
1,000	,,	,,	100	,, ...	...	,,	0	3	0

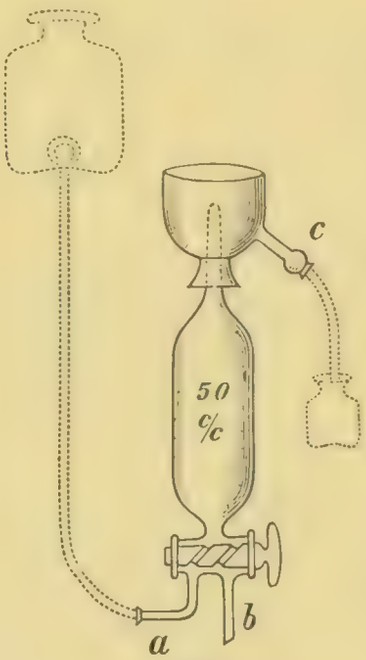


872

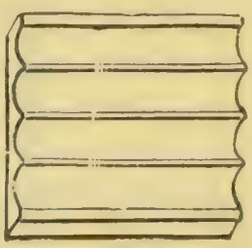
872 **Graduated Funnel Pipette,** with Caoutchouc Top for delivering test solutions in small quantities—50 c.c. in ½ c.c. ... £0 3 6



873



873A



874

873 **Pipette** fitted with Stopcock, and upper Bulb with Tubes, for drawing off poisonous liquids without going into the mouth. Capacity lower bulb marked—

5	10	20 c.c.
4/	4/3	4/6 each

873A **Automatic Pipette,** with Patent Stopcock. The Pipette, which may be of any size, with 3-way Stopcock, is connected with a Tubulated Funnel and India Rubber Stopper and at A with India Rubber Tube to Reservoir, the overflow runs out at C, collected in a Vessel and returned to Reservoir. This Apparatus is adapted for taking samples or adjusting measures—

10	25	50	100 c.c.
5/6	6/	6/6	7/ each

874 **Porcelain Fluted Rest,** for Pipettes, with 4 Flutes ... each £0 1 0



875 876 877 878 879 880

875 **Graduated or Marked Flasks,** gauged at one mark in the neck to deliver precise quantities—

10	cubic centimetres	... ...	each	£0	0	4
25	,,	... ...	,,	0	0	5
50	,,	... ...	,,	0	0	6
70	,,	... ...	,,	0	0	8
100	,,	... ...	,,	0	0	8
150	,,	... ...	,,	0	0	9
200	,,	... ...	,,	0	0	10
250	,,	or ¼ litre	,,	0	1	0
300	,,	... ...	,,	0	1	2
500	,,	or ½ litre	,,	0	1	2
700	,,	... ...	,,	0	1	4
750	,,	or ¾ litre	,,	0	1	4
1,000	,,	or 1 litre	,,	0	1	6
2,000	,,	or 2 litres	,,	0	2	6

876 **Graduated Flasks,** with one mark, stoppered—

10	cubic centimetres	... ...	each	£0	0	6
25	,,	... ...	,,	0	0	7
50	,,	... ...	,,	0	0	8
100	,,	... ...	,,	0	0	10
150	,,	... ...	,,	0	1	0
200	,,	... ...	,,	0	1	3
250	,,	or ¼ litre	,,	0	1	6
300	,,	... ...	,,	0	1	8
500	,,	or ½ litre	,,	0	1	9
700	,,	... ...	,,	0	2	0
750	,,	... ...	,,	0	2	0
1,000	,,	or 1 litre	,,	0	2	3
2,000	,,	or 2 litres	,,	0	3	0

877 **Graduated Flasks,** with two marks in neck—

50 and 55 cubic centimetres	...	...	...	each	£0	0	9
100 „ 110	„	...	...	...	„	0	1	0

878 **Graduated Flasks,** Geissler's, with two marks for measuring and pouring—

100 cubic centimetres, plain, each 1/				stoppered, each		0	1	3
200	„	„	1/3	„	„	0	1	6
250	„	„	1/6	„	„	0	1	9
500	„	„	1/9	„	„	0	2	0
1,000	„	„	2	„	„	0	2	6

879 **Graduated Flasks,** with one mark (Grains)—

500	1,000	1,500	2,000	5,000	10,000	20,000	grains
10d.	1/	1/2	1/3	1/6	1/9	2/6	each

880 **Graduated Flasks,** with one mark, stoppered—

500	1,000	1,500	2,000	5,000	10,000	20,000	grains
1/	1/3	1/4	1/6	1/9	2/	2/9	each

881 **Graduated Flasks** (Decigallon)—

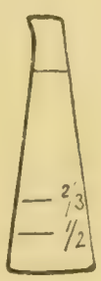
½ decigallon, with one mark, 10d.;				stoppered	...	each	£0	1	0
1 „	„	1/3	„	...	„	0	1	9

882 **Graduated Flasks** (Ounces)—

5 ounces, one mark, 1/3;				stoppered	...	...	each	0	1	6
10 „	„	1/6	„	...	...	„	0	1	9
20 „	„	1/9	„	...	...	„	0	2	0
40 „	„	2/6	„	...	...	„	0	3	0



883A



883B



884

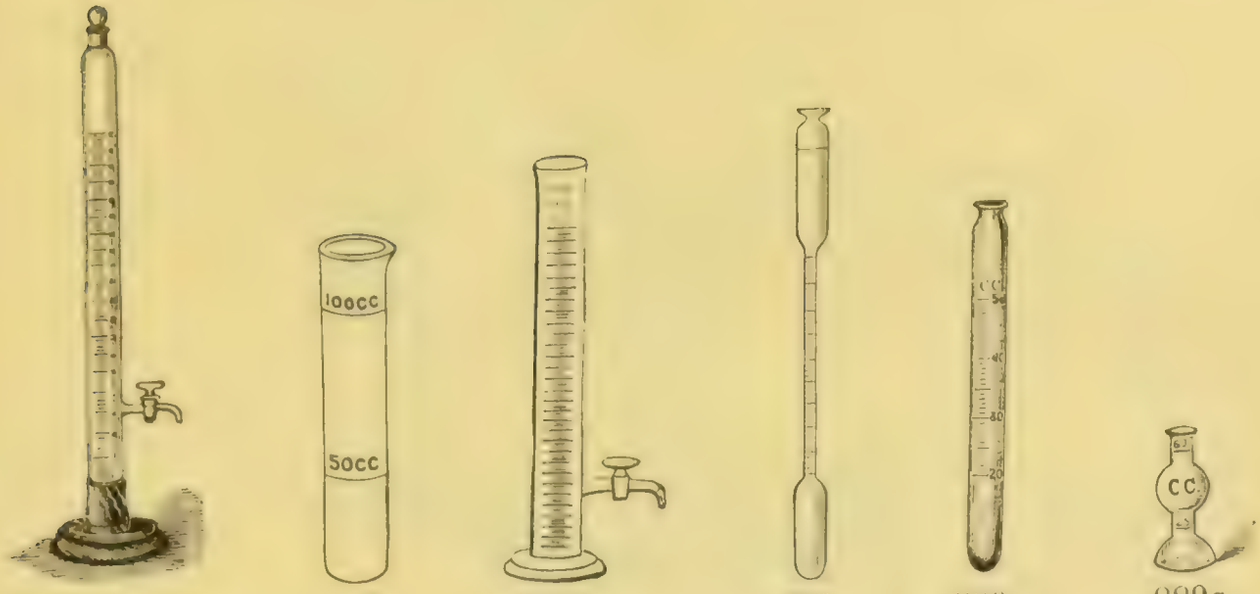


885

883 **Standard Measure Flasks or Receivers,** as used at H.M. Customs, for the Estimation of Spirit in Wines, either form, A or B ... ... each £0 1 4

884 **Standard Measures or Receivers,** with mark at 1,600 grains, as used at H.M. Inland Revenue, for taking the Original Gravities of Beer ... ... each 0 1 4

885 **Standard Measures or Receivers,** Pear Shape, Thin Glass, with Lip and Narrow Neck for greater accuracy ... each 0 1 9



885A 888 889 889A 889B 889C

885A **Graduated Tube,** Dr. Muter's, with Stopcock and Stopper, on Wooden Foot, for Oleic Test, graduated to 200 c.c. ... £0 7 6

886 **Nessler Glasses,** colourless glass and polished end, for Water Analysis, Plain ... ... each 0 0 7

887 Ditto do. Length 24 in. × 2 in. „ 0 5 6

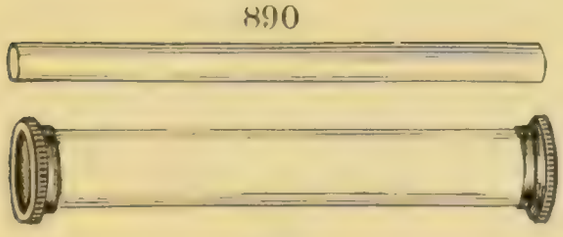
888 **Graduated,** one mark at 50 c.c., 9d.; two marks 50 & 100 c.c. 0 0 11

889 **Graduated Nessler Tubes,** with Stopcock, 100 c.c. into 10 parts, as recommended by Dr. Hehner ... ... each 0 4 0

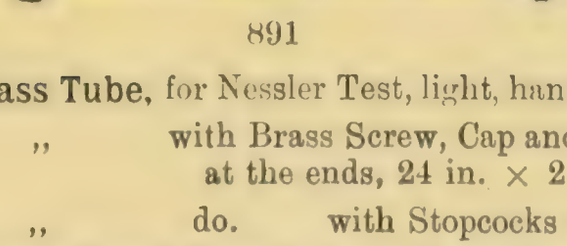
889A **Stoke's Tubes,** for Estimation of Fat in Milk, 50 c.c.... ... 0 2 6

889B Ditto do. 50 c.c.... ... 0 1 6

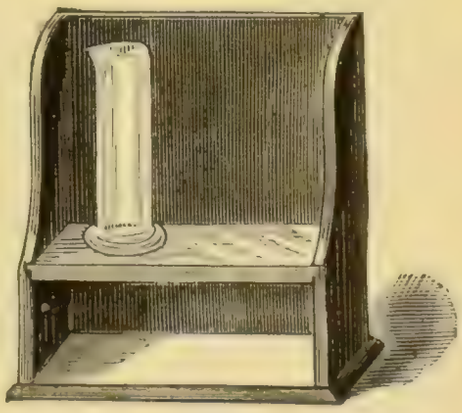
889C **Volney's Flask,** for Analysis of Butter, graduated at 25 and 60 c.c. ... ... each 0 1 6



890



891



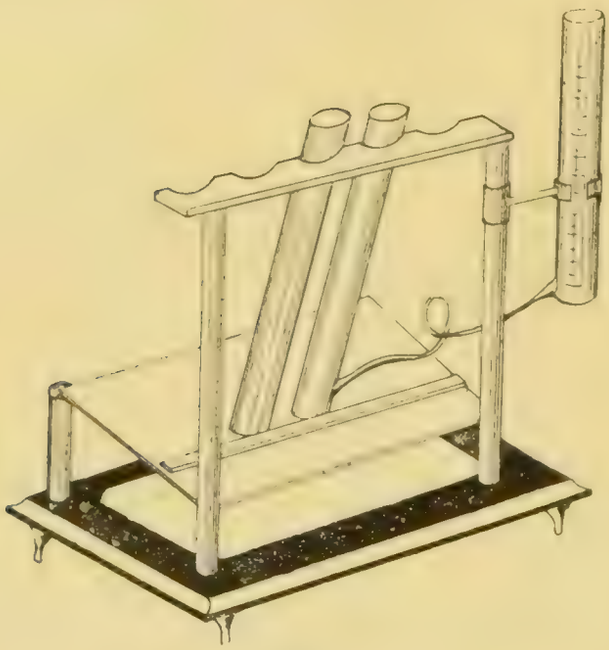
892

890 **Glass Tube,** for Nessler Test, light, hand-made, 24 in. × 1 in. each £0 1 6

891 „ with Brass Screw, Cap and Collar, and Glass Plates at the ends, 24 in. × 2 in. ... ... each 0 15 0

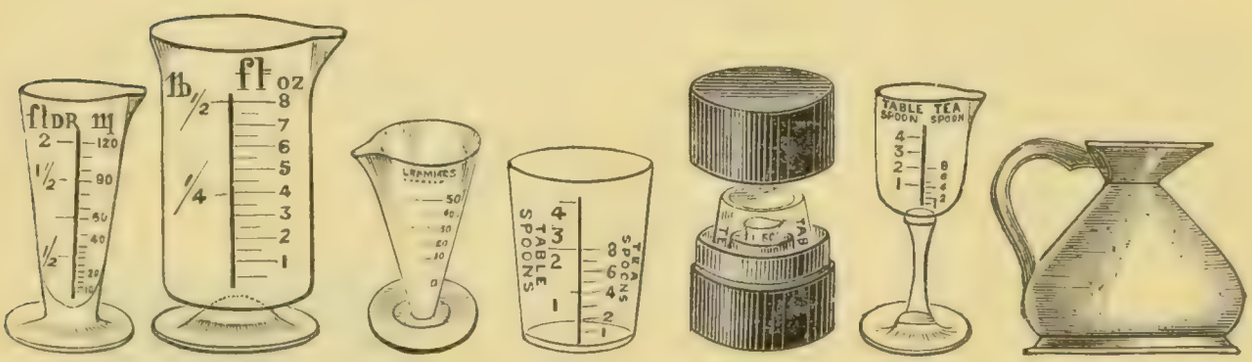
891A „ do. with Stopcocks for Inlet and Outlet „ 1 1 0

892 **Black Wood Stand,** with Plate Glass Shelf in centre and White Opaque Glass at the bottom, for use in Nessler Test, by Gas or Daylight ... ... each 0 3 6



892B

892B **Colorimeter,** Stokes', two Nessler Tubes with Tubulure at side, one graduated, Glass Plate on Frame acting as support, also for observation, over White Opaque Glass, complete, with two extra Nessler Tubes £0 16 0



893 895 899 901 901A 902 902A

Graduated Measures, Minims, Drams, and Ounces, conical form to 4 oz. cylindrical upwards—

893	Conical—	1 dr.	2 dr.	1 oz.	2 oz.	4 oz.	
		4d.	5d.	5d.	6d.	8d. each	
895	Cylindrical—	6	8	10	16	20	40 oz.
		9d.	10d.	1/	1/2	1/4	2/4 each

Graduated Measures, same as above, with Official Stamp—

896	Conical—	1 dr.	2 dr.	1 oz.	2 oz.	4 oz.	
		8d.	9d.	8d.	9d.	1/ each	
898	Cylindrical—	6	8	10	16	20	40 oz.
		1/2	1/4	1/6	1/8	1/9	2/9 each

899 **Graduated Measures,** Conical—

50	100	150	250 c.c.
1/3	1/6	1/9	3/ each

900 **Graduated Measures,** Cylindrical, similar to Fig. 895, German Glass—

4 ounces, graduated into 8 divisions	...	...	each	£0	1	0
5	,,	,,	10	,,	...	...	,,	0	1	2
8	,,	,,	16	,,	...	...	,,	0	1	4
10	,,	,,	20	,,	...	...	,,	0	1	6
20	,,	,,	40	,,	...	...	,,	0	2	0

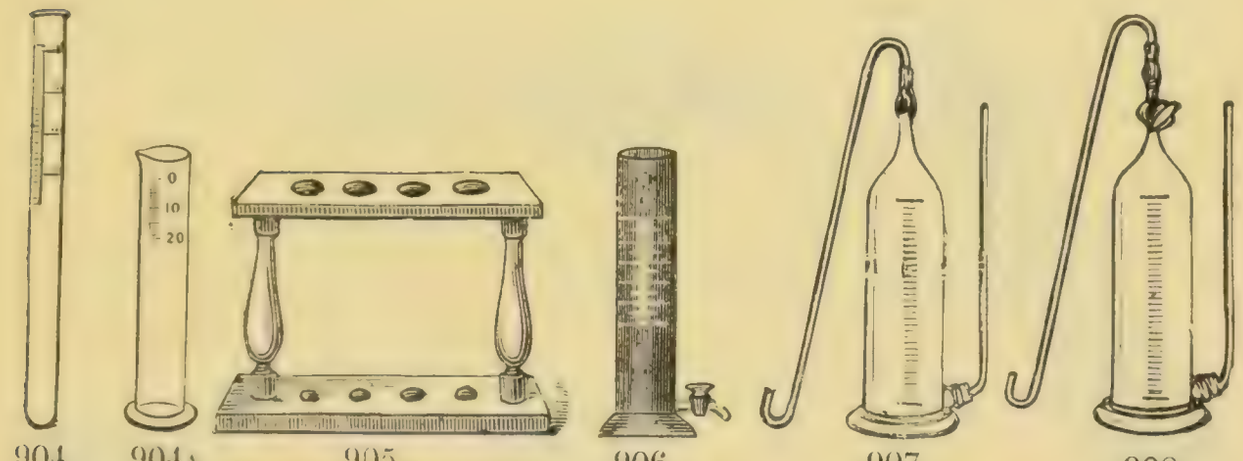
901 **Graduated Measures,** Tea Spoon and Table Spoon, Tumbler form 0 0 5

901A ,, ,, Patient's Companion, Tumbler form, with Minim Measure, in leather case ... 0 1 6

902 ,, ,, Wineglass form, with spout 0 0 6

902A **Measures,** Copper, tinned inside—

½	1	2	3	4 gallons
12	15/	21/	28/	35/ each



904 904A 905 906 907 908

904 **Graduated Cream Tubes,** for showing the percentage of Cream in Milk, best make, engraved, 8/ per doz. each £0 0 9

904B **Graduated Cream Tube,** cheaper make, 5/6 ,, ,, 0 0 6

904A ,, ,, on foot, 10/ ,, ,, 0 1 0

905 **Mahogany Stand** to hold four Tubes ... ... ,, 0 1 6

906 **Cremometer,** with Stopcock, Chevalier's ... ... ,, 0 5 6

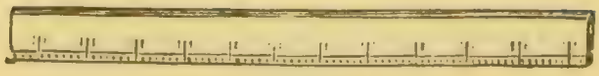
906A ,, without Stopcock ... ... ,, 0 2 6

907 **Graduated Gas Holder,** Bunsen's, for mercury, divided into about 150 millimetres ... ... each 0 5 0

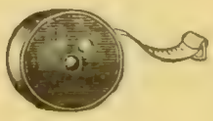
908 **Gas Holder,** Bunsen's, for Mercury, with Glass Stopcock, divided into about 160 millimetres ... ... each 0 7 6



909



910



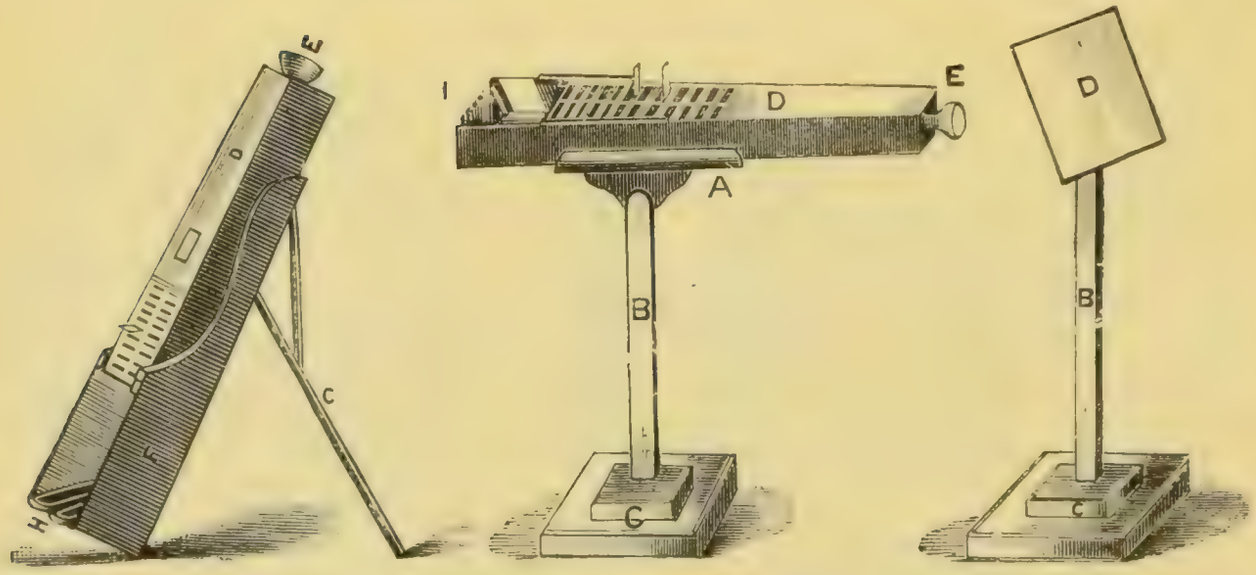
910A

909 **Graduated Measures of Length,** Boxwood, with 6 joints, marked in centimetres and millimetres, and corresponding English inches ... ... each £0 1 3

910 ,, Boxwood, straight, 12 in. long, divided into centimetres, millimetres, and English inches each 0 0 10

910B ,, One metre long, divided into centimetres and millimetres to 200 one side, and 1 yard, divided into inches, $\frac{1}{8}$ths, $\frac{1}{10}$ths on other side ... each 0 2 0

910A ,, Steel Spring Tape, graduated into inches on one side and millimetres the other; Tape $\frac{1}{4}$ in. wide, enclosed in Circular Brass Box $1\frac{1}{4}$ in. diameter ... ... each 0 3 6



906B **Lovibond's Tintometer,** for Measuring and Recording all Colours, for Silk and Cotton Dyers, Paper Manufacturers, Brewers, Soap and Steel Manufacturers; complete set of Apparatus for Dyers and Printers, with 100 Standard Glasses, in Polished Box £9 9 0

Do. for Brewers, with 20 Standard Glasses 5 5 0

Extra Apparatus for Dry Malt 2 2 0

Do. for percentage of Carbon in Steel, with 2 1-in. Vulcanite Cells and 30 Standard Glasses 5 5 0

Do. for Estimation of Colour in Water, with 40 Standard Glasses, 2 ft., 1 ft., and 6 in. Brass Cells, in Plain Wood Case 7 7 0

HYDROMETERS.

For Ascertaining the Density of Acids, Solution of Salts, Vegetable Infusions, Spirits, Ethers, Petroleum, &c., calculated at 60° F. temperature.

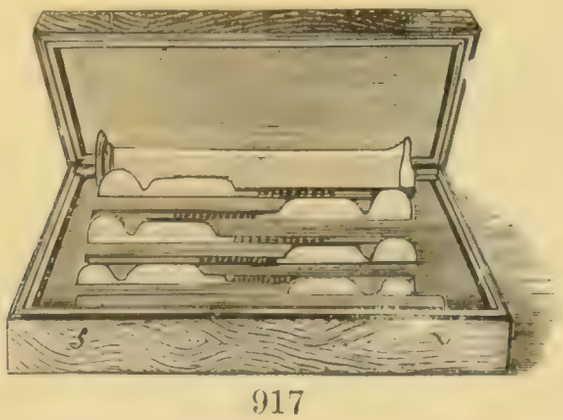


911



920

911		**Specific Gravity Hydrometer,** for Acids, &c., heavier than Water, scale divided into tens, 1,000 to 2,000, in Cardboard Case ... ... each	£0	2	3
911A	..	,, 700 to 2,000 ... ... ,,	0	4	0
912	..	For closer determinations, scale divided in twos, 700 to 1,000, 1,000 to 1,300, 1,300 to 1,600, 1,600 to 1,900, in Cases ... ... each	0	2	9
913	..	Scale 1,000 to 1,500, and 1,500 to 2,000, in fives ,,	0	2	3
914	..	Spirits, Ethers, and Liquids lighter than Water, scale 700 to 1,000, divided in fives, in Cases ... each	0	2	3
916	..	Specific Gravity, 700 to 800, 800 to 900, &c., to 2,000, in separate Spindles, each containing 100 degrees in single divisions	0	2	0
	..	With Thermometers enclosed, to order... each extra	0	1	6



917

917	**Specific Gravity Hydrometers,** Set of 4 Spindles, 700 to 1,000, 1/1300, 13/1600, 16/2000, in single degrees, with Thermometer and Trial Glass, in Polished Case, lined, each piece fitted	£1	7	6

918 **Specific Gravity Hydrometers,** Set of 7 Spindles, 700 to 850, 850 to 1,000, 1/1200, 12/1400, 14/1600, 16/1800, 18/2000, in single degrees, with Thermometer and Trial Glass, in Polished Case, lined and fitted £1 17 6

919 **Twaddell's Hydrometers,** for Liquids heavier than Water, with bulbs filled with mercury. Each degree is equal to 5° specific gravity; to find the equivalent multiply by 5 and add 1,000, thus :—

$$42 \times 5 = 210 \div 1{,}000 = 1{\cdot}210 \text{ Sp. Gr.}$$

	Twaddell's Scale.	Specific Gravity.
Number 1 ...	0 to 24	= 1·000 to 1·120
,, 2 ...	24 to 48	= 1·120 to 1·240
,, 3 ...	48 to 74	= 1·240 to 1·370
,, 4 ...	74 to 102	= 1·370 to 1·510
,, 5 ...	102 to 138	= 1·510 to 1·690
,, 6 ...	138 to 170	= 1·690 to 1·850

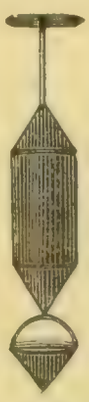
Either number in Cardboard Case ... per doz. 12/, each 0 1 2

920 **Twaddell's Hydrometers,** small size, length of Spindle 6 in., for taking the gravity of smaller quantities, same numbers and scale ... ... per doz. 12/, each 0 1 2

Less than 1 doz. charged at single price.



921



926

921 **Twaddell's Hydrometers,** Set of 6 Spindles, with Thermometer and Trial Jar, in Polished Case, lined and fitted ... £1 0 0

921A The Set, as above, but in Leather Case 0 15 0

922 **Hydrometers,** for Petroleum Spirit, Light Oils, &c., small, for testing samples, length of scale about 3 in. marked into single degrees :—700° to 750°, 750° to 800°, 800° to 850°, 850° to 900°, 900° to 950°, 950° to 1,000°. In Cases, each 0 1 6

923 **Beaume's Hydrometers,** for Heavy Liquids, Acids, Soap Leys, Syrups, &c., graduated into ¼ degrees, in Cases—

0 to 10	0 to 25	0 to 40	40 to 70
1/3	1/6	1/8	1/10

,, For Liquids lighter than Water, 10 to 60 ... each £0 1 6

Comparative Scale of Beaume's Hydrometers for Heavy Liquids.

Beaume.	Specific Gravity.	Beaume.	Specific Gravity.
0	1·000	40	1·385
10	1·075	50	1·532
20	1·161	60	1·714
30	1·263	70	1·946
	For Light Liquids.		
40	·817	26	·892
36	·837	20	·928
30	·871	10	1·000

924 **Hydrometer for Spirits,** Sikes' Proof Scale, 45 underproof to 65° overproof. In Cardboard Cases ... each 0 2 3

924A **Sikes' Hydrometer,** Standard, Glass, graduated from 0 to 100, 12 in. long, for use with Sikes' Book, in Tin Case ... ... each 0 8 0

924B ,, Set of 3, each Spindle showing 33 degrees, 11½ in. long, guaranteed to less than 0·2 degrees error, in Tin Cases... ... ... per set 1 1 0

924C ,, in Polished Wood Box 1 10 0

924D **Alcohometer,** Gay Lussac, with Thermometer ... each 0 3 0

,, ,, without ,, ... ,, 0 1 6

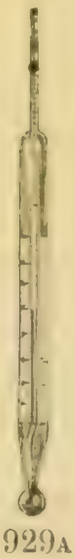
924E ,, Tralles, 0—100% ... ... ,, 0 1 6

925 ,, Nicholson's, for taking Specific Gravity of Solid Bodies. Japanned Tin 0 4 0

926 ,, ,, ,, ,, Polished Brass 0 5 6



928



929A



930





931



929B



941C

927 **Lactometer, or Milk Tester,** with Jar and Case, small each £0 1 3

928 ,, ,, ,, Superior quality ,, 0 2 0

928A ,, ,, without Jar ... ,, 0 1 6

928B ,, Double Ivory Scale, Specific Gravity, and Milk, with Directions, in Case ... each 0 2 0

928c	**Lactometer,** with graduated Jar, for Cream Test	each	£0	3	0
929	,, with Centessimal Scale, without Jar...	,,	0	2	0
929a	,, **and Dairy Thermometer,** combined	,,	0	2	6
929b	**Floating Dairy Thermometer**		0	2	6
930	**Lactoscope, Vogel's,** consisting of two pieces of colourless Plate Glass mounted on Brass Frame, Trial Jar about 300 Septems capacity, with mark at 100 Septems, and a Pipette holding 10 Septems graduated into ½ Septems, set complete		0	6	0
	The Trough only		0	3	6
931	**Lactoscope, French,** with moveable diaphragm, for Optical Test		0	2	6
932	**Cartier's Hydrometer with Thermometer,** in Case ...		0	3	0
933	**Oleometer,** for Linseed, Rape, Sperm, Olive, &c., the standard qualities of which are indicated on the scale. In Case		0	2	0
933a	,, with Ivory Scale		0	2	9
934	**Argentometer,** for Testing the Strength of Nitrate of Silver in Solution, for Photographic use, with Glass Jar. In Case complete		0	2	6
935	**Saccharometer,** for Brewers' use, with directions, showing 0 to 50 pounds per barrel, Paper Scale. In Case, each		0	2	6
	Ivory Scale		0	2	9
936	,, for Brewers' use, for taking the Specific Gravity of Beer. Graduated into single degrees, 1·040 to 1·080, and 1·080 to 1·125. In Cardboard Case		0	2	6
936b	,, Bates' do., 1·000 to 1·100, Glass ...	each	0	3	0
938	,, Bates', Gilt, with Weights and Thermometer, as used at the Inland Revenue Laboratory. Best make, doubly gilt and best finish, in Polished Mahogany Case		3	10	0
938a	,, Small Size, for Pocket		2	0	0
938b	,, Brix's, Set of 3 Spindles, in ½ degrees, 0 to 30; 30 to 60; 60 to 90		0	7	6
938c	, Brix's Set of 3, with Thermometer in Stem in ⅕ degrees – 5 to + 30; 25 to 60; 55 to 85		0	18	0
938d	,, Ballings', 0 to 75, without Thermometer	each	0	2	0
938e	,, ,, ,, with ,, ,,		0	3	6
938f	,, "Standard," Glass, for Brewers' use, Set of 2, 0 to 25, and 25 to 50 lbs. per barrel, in Polished Mahogany Box	per set	1	10	0

938G **Saccharometer,** "Standard," Glass, Specific Gravity 1·000 to 1·060, and 1·060 to 1·120, in Polished Mahogany Box, as above... ... ... £1 10 0

938H „ Doubly Gilt, for Brewers' use, showing to 50 lbs. per barrel, with rule Thermometer, Expansion Scale, and Book of Instructions, in Polished Mahogany Case, with Lock and Key 2 10 0

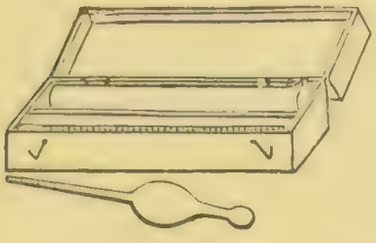
939 **Barktrometer,** 0 to 80, in Case ... ... each 0 2 6

940 **Ammoniometer,** Ivory Scale ... ... „ 0 2 6

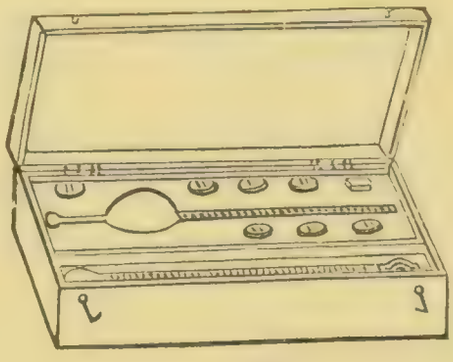
941 **Salinometer** „ „ with directions ... „ 0 2 0

941A **Acidometer,** for use in Accumulators, Flat Bulb, length about 10 in., from 1·100 to 1·250 ... ... each 0 2 0

941C **Salinometer,** Metal, Gilt 0 5 0



945



946

942 **Urinometer,** for Medical use, in Leather Case .. ... each £0 2 6

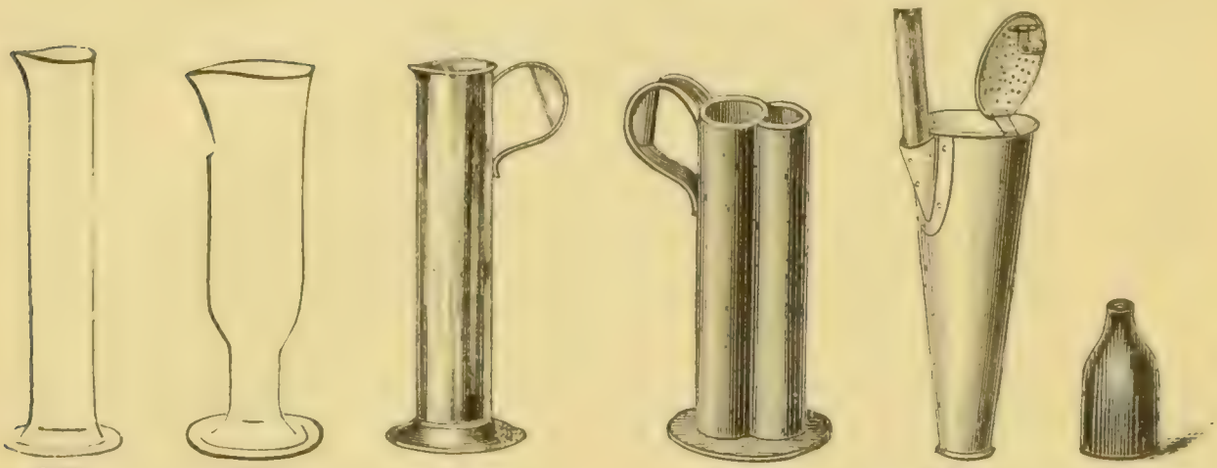
„ In Case complete, Graduated Immersion Tube... „ 0 4 0

944 „ Immersion Tubes, Graduated ... ... „ 0 0 8

945 .. With Graduated Immersion Tube and Thermometer, in Leather Case, complete ... ... each 0 10 6

946 **Sikes' Revenue Hydrometer,** Doubly Gilt, with Weights, Ivory Thermometer, Proof and Mixing Rules, Trial Glass, and Book of Tables, complete for ascertaining the Specific Gravity of Wines and Spirits up to 80° F., in Polished Mahogany Box ... ... each 2 10 0

946A Same as above, but without the Proof and Mixing Rules, with smaller Thermometer ... ... each 2 0 0



949 950 950A 950B 950D 951

949 **Hydrometer Immersion Tubes,** White Glass, with Spout—

6	8	8	10	10	12	12	12	14	14 in. height
1¼	1½	2½	1⅝	2	1¾	2	2½	2	2½ in. diam.
6d.	8d.	1/	9d.	10d.	1/	1/1	1/4	1/4	1/6 each

Other sizes made to order.

950 **Hydrometer Immersion Tube,** or Trial Glass, with Hollow Stem for Sykes' Hydrometer ... ... each £0 1 0

950A ,, Immersion Tube, Copper, 12 × 2½ in. .. ... ,, 0 6 0

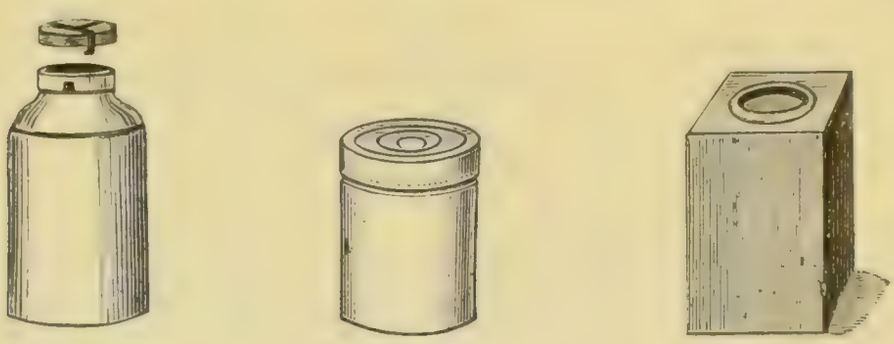
950B ,, ,, Double, for Hydrometer and Thermometer, Japanned Tin 0 3 6

950C ,, ,, Ditto Copper 0 10 6

950D **Copper Sample Can** with Perforated Cover, for taking Samples from the Mash Tun 0 10 6

Ingot Moulds (*see Assay Apparatus*).

951 **Ink,** Sabatier's, for writing on Glass, in Gutta Percha Bottle 0 1 6



952 952A 953

952 **Stoneware Jars,** with Ground Air-tight Covers, for storing Dry Chemicals—

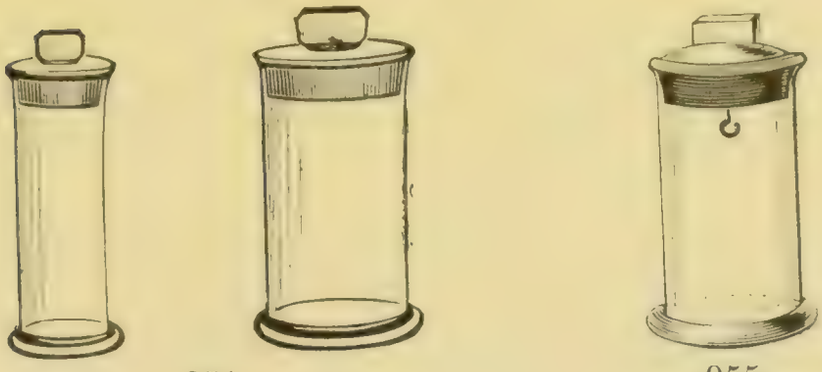
Capacity 1	2	3	4	6	8	12 quarts
1/6	2/	2/3	2/6	3/3	4/	5/6 each

952A **Stoneware Jars,** with Shut-over Lids, for storing Dry Chemicals—

Capacity	1	2	3	4	6	8 pints
	9d.	1/	1 3	1 6	1/9	2/ each

953 **Tin Canisters,** Wide Mouth, with Lever Tops, Airtight, for storing Dry Chemicals, Square—

6×6×9	8×8×12	9×9×9	9×9×13 in.
9d.	1 2	1 4	1/6 each



954 955

954 **Glass Jars,** Stoppered, for Anatomical Specimens, Samples, &c., Best White Crystal Glass, with Polished Stoppers—

4½	6	5½	7½	6½	6½	9½	9½ in. height
1¼	1½	2¾	2	3½	4¾	2¾	4½ in. diam.
8d.	11d.	1/4	1/3	1/10	2/9	2/6	3/6 each

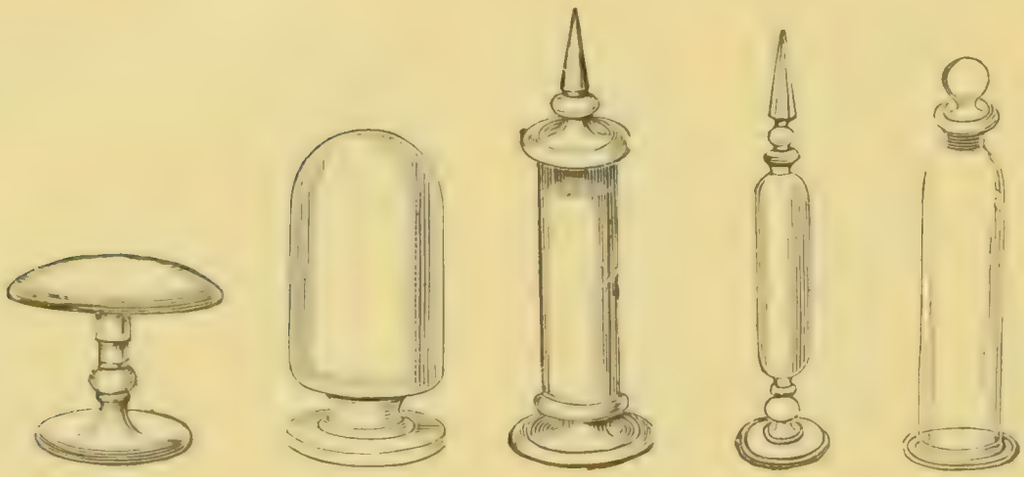
12½	10½	16	16	21	21	17 in. height
4	5¾	4¾	6¼	7½	8½	10 in. diam.
4/	7/6	7/	12/6	20/	26/	30/ each

954A **Glass Jars,** same as above, White Glass, Stoppers not Polished—

12½	10½	16	16	21	21	17 in. height
4	5¾	4¾	6¼	7½	8½	10 in. diam.
3/6	5/6	6/6	10/	15/	20/	25/ each.

Any other intermediate sizes made to order.

955 **Glass Jars,** for Anatomical Specimens, with Glass Hooks in Stopper for suspension, same sizes as above ... 6d. each extra



956 957 958 959 960

956 **Specimen Glasses,** Table Form, White, Colourless, for Exhibition of Specimens, Crystals, &c., Broad Foot Stoppered into Top—

Diam. of top	3	4	5½ in.
	1/9	2/	2/9 each

957 **Specimen Glasses,** Bohemian Glass, Dome Shape, for Show Cases, Crystals, &c., with Polished Stopper for Base—

Capacity	2	4	6	10	20	30	40 oz. about
	9d.	10d.	1/	1/3	1/9	2/6	3/6 each

958 **Specimen Glasses,** Cylindrical, with Broad Foot, Cut and Polished Top, loose—

Height to shoulder 12 in. ; Diameter 2½ in.—each £0 4 0

959 ,, Cylindrical, Narrow Mouth, Cut and Polished Stopper, for Oils, &c.—

Height to top of Stopper 16 in. ; Diam. 1½ in.—each 0 2 9

960 ,, Cylindrical, Plain Stopper, Height to top of Neck, exclusive of Stopper—

7×1	10×1⅛	12×1½	13×2	16×2½	16×3¾ in.
1/2	1/4	1/9	2/6	3/6	5/ each

Corresponding with sizes of Stoppered Test Mixers, 50 c.c. to 1,000 c.c.

Other sizes of all the above made to order.



961



962

961 **Specimen Jars,** Cylindrical, White Bohemian Glass, Welted Top Form, with Stout Glass Cover ground to fit, for Anatomical Specimens, Samples, &c.

2⅜	3¼	4	4	3½	5½	4	3¼ in. height
¾	1	1¼	1½	1¾	2	2¼	2⅜ in. diam.
6d.	8d.	10d.	1/	1/	1/3	1/3	1/3 each

5½	4	4	6	7¼	6¼	6¾ in. height
2⅜	2¾	3½	3½	3½	5¼	6 in. diam.
1/6	1/9	2/6	3/	3/6	5/6	8/ each

962 **Specimen Jars,** Strong Glass, Shallow Form, Welted Top, with Stout Glass Cover ground to fit—

3	3¼	4	4¾	4¾	5½ in. height
3	3½	6¼	7	8½	10¼ in. diam.
1/6	2/	3/	4/	5/	7/6 each

Other sizes made to order.

963 **Labels for Reagents,** Gummed, Large Type, New Notation, with Symbols, in Books containing 112 Labels, Ends Perforated ... ... each £0 0 6

SPECIMEN

BARIUM CHLORIDE

$Ba Cl_2 2 H_2 O$

964 **Labels,** in Books containing upwards of 400 Labels, Large Type, with Symbols for all the Principal Reagents used in Laboratories, and other Substances, Ends of Labels Perforated for convenience of cutting, in Book with Stout Cover ... ... each 0 1 0

965 ,, Plain, Gummed, in Packets containing 100. The following sizes kept in stock—

2½ × ¾	2½ × 1	3¼ × ⅞	3¼ × 1½	3⅞ × ½	4 × 1	4¼ × 1¼	in.
3d.	4d.	5d.	6d.	3d.	7d.	8d.	each



966

966 **Ladles,** Wrought Iron, with Handle 12 to 16 in. long—

Diam. of Bowl	3	3½	4	5	6 in.
	9d.	10d.	1/	1/4	2/ each

LAMPS FOR SPIRIT.



967 968 969 970 971

967 **Glass**, with Ground Glass Cap and White Stoneware Wick Holder—

Capacity 1 oz.	each	£0	0	8
,, 2 ,, ...	,,	0	0	9
,, 4 ,, ...	,,	0	0	10
,, 8 ,, ...	,,	0	1	0

968 ,, with Ground Glass Cap and Brass Screw Wick Holder—

Capacity 1 oz.	each	0	1	2
,, 2 ,, ...	,,	0	1	3
,, 4 ,, ...	,,	0	1	6
,, 8 ,, ...	,,	0	1	9

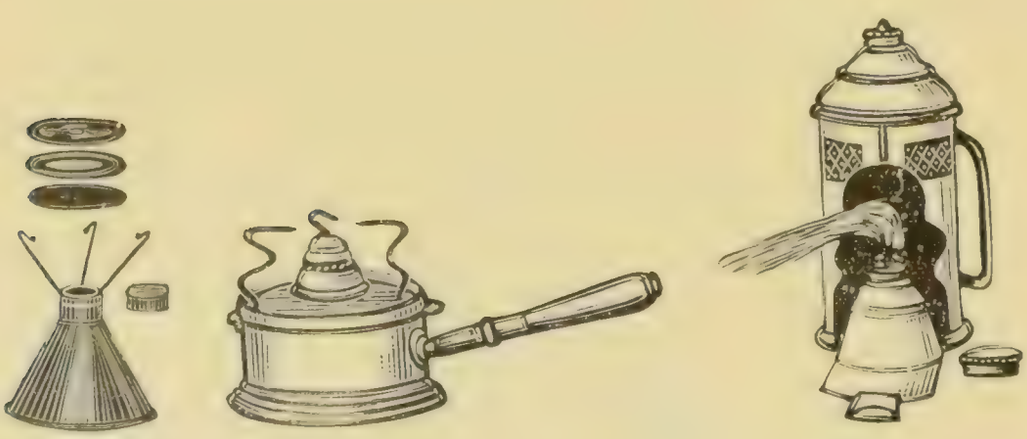
969 ,, with Ground Glass Cap, Wick Holder, and Stopper at the side—

Capacity 4 oz.	each	0	1	3
,, 8 ,, ...	,,	0	1	6

970 ,, Ditto Shallow, with Broad Base—

Capacity about 2 oz.	,,	0	0	10
,, 4 ,, ...	,,	0	1	3

971 ,, Berlin Porcelain—Capacity about 4 oz. ... ... ,, 0 2 6



972 974 975

972 **Lamp, Tin Spirit**, Double Current, for Quick Boiling, Evaporating, &c., with Support, 2 Rings, and Hot Plate for Dishes, &c., capacity 8 oz. ... ... each £0 2

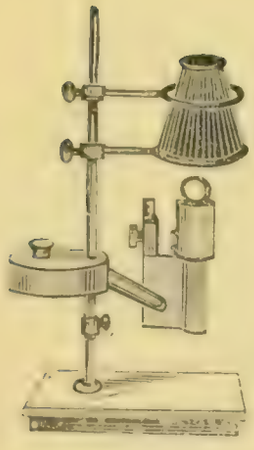
974 **Lamp, Argand Spirit,** White Metal, with strong Wire Supports for Flasks, &c., and Metal Top, with Screw ... each £0 1 0

Larger size ... ... ,, 0 3 3

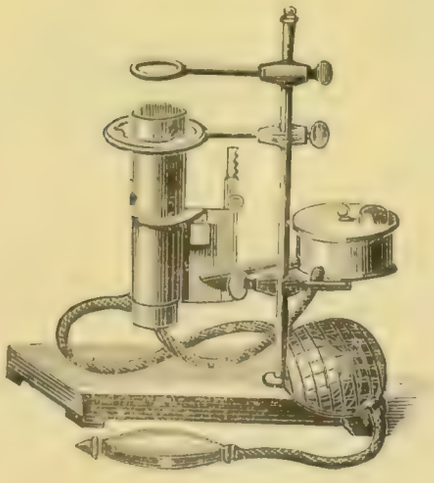
974A ,, Three Flame... ... ... ,, 0 4 0

975 ,, **French Spirit,** Blowpipe, with Brass Spirit Lamp, Copper Reservoir, and Safety Valve, for bending Glass Tube, soldering or heating substances—

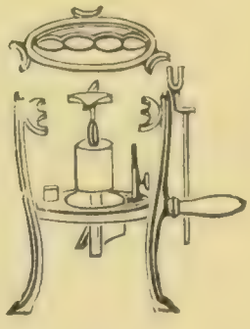
No.	1	2	3	4
	2/9	3/3	4/	5/ each



977



977B



979

977 **Lamp, Berzelius' Argand Spirit,** Brass, with Rod on Wood Foot, Brass Rings and Chimney, and 1 doz. extra wicks £0 16 6

977A ,, With Porcelain Foot... ... ... 1 0 0

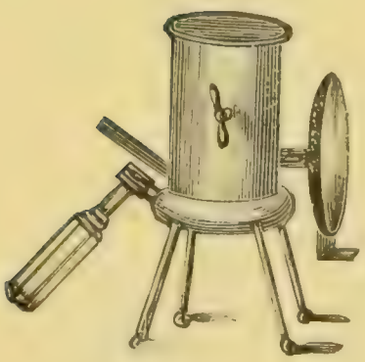
977B ,, **Dornbusch's,** with Blowing Apparatus 1 5 0

978 ,, **Mitscherlich's Argand Spirit,** similar in construction to Fig. 977, with Plattner's Blast Tubes, which may be attached to Foot Bellows to obtain greater heat for Fusions, &c. 1 10 0

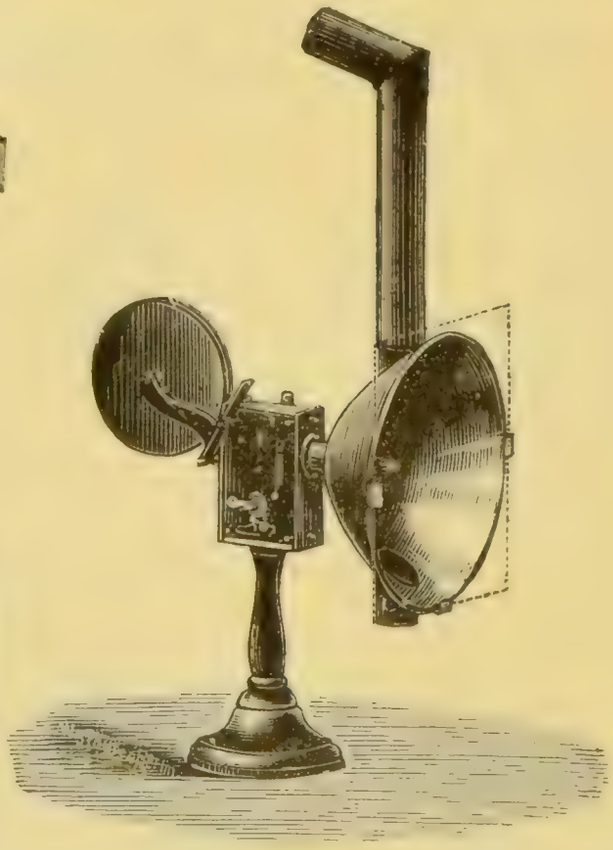
979 ,, **Luhme's Argand Spirit,** with Porcelain Handle, Brass Support, Rings, and Chimney, with 1 doz. extra wicks small size, 16/, large size 1 2 6



980



981



981A

980 **Lamp, Vertical or Russian Blast Brass,** Brazed, for Fusions, &c. ... ... 8/ and £0 14 6

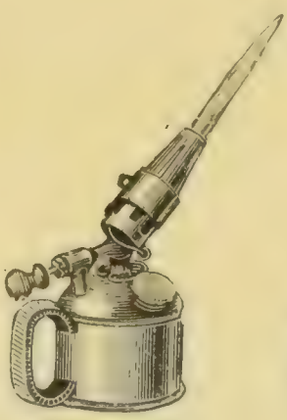
981 ,, Magnesium Portable, Brass, with Reflector 3½ in. diam., and Clockwork arrangement 1 2 6

981A ,, Magnesium, Clockwork, for two Tapes, with Parabolic Reflector, Chimney, &c. 3 12 6

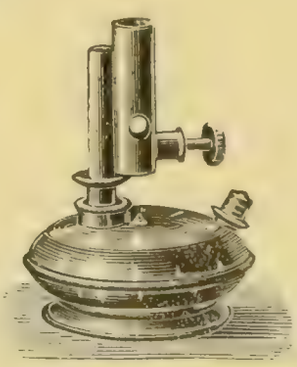
IN USE.



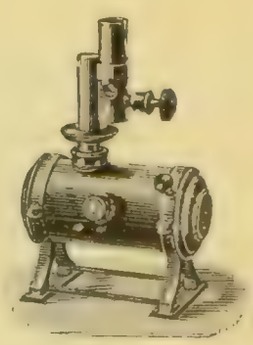
982



983



983A



983B

982 **Lamp, Richaud's Spirit,** 3-Flame Travelling, with Boiler complete. Can be taken to pieces and packed in Boiler—

Tin ...	Capacity of Boiler ¾ Pint	...	each	£0	4 6
Brass ...	,, ½ ,,	...	,,	0	10 6
Copper ..	,, 1 ,,	...	,,	0	11 6

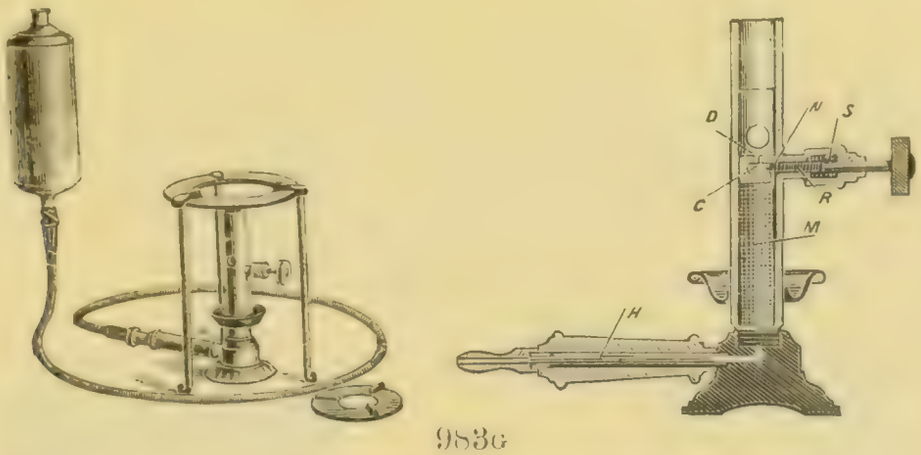
983 **Lamp, Swedish Patent Benzoline Blast,** very powerful, for heating up to about 2,000 Fah., bending Hard Glass Tube, Soldering, Ignition, &c. Absolutely safe from explosion, easily regulated, and will last in constant use for years ; when filled with Benzoline will work for two or three hours without refilling £1 1 0

983A **Barthel's New Blast Burner,** for Benzoline, for Blowpipe and Laboratory purposes 1 2 6

983B **Barthel's Blowpipe Table Lamp,** which can be worked in any position 1 4 0

To light these Lamps, fill a little spirit in the saucer and light up. Keep the regulating screw closed until spirit is burnt out. Then open screw (half a turn is sufficient), and light the benzine vapours at the top. The wire netting must be kept clean. If the small opening in the burner tube becomes choked, clear it by the needle sent with the lamp ; never use a pin. It is most important *not to enlarge* this opening.

983D **Barthel's Burner,** same as No. 983A, arranged to burn Methylated Spirit £1 0 0



983G

983G **Barthel's Patent Automatic Bunsen Burner,** for Methylated Spirit, with Container, 5 ft. Flexible Metallic Tubing, Iron Tripod with Ring, complete

No. 1. Flame 8 in. £1 10 0
No. 2. ,, 10½ ,, 1 17 6

Instructions.—Join one end of the flexible metallic tubing to the container, and the other end to the Bunsen burner. Fill the container with methylated spirit, about 1¾ pints, and hang it up a yard above the bench or table (not higher).

To light up the Bunsen burner, first open the tap underneath the container, give the methylated spirit time to fill the flexible tube, then give the screw regulating valve of the burner *half a turn* to the left, and let some spirit overflow into the saucer till same is about one-third filled. Then close the regulating valve, set light to the spirit in saucer, this having burnt out, open the valve *half a turn only*, and set light to the spirit-vapours escaping at the mouth of the burner.

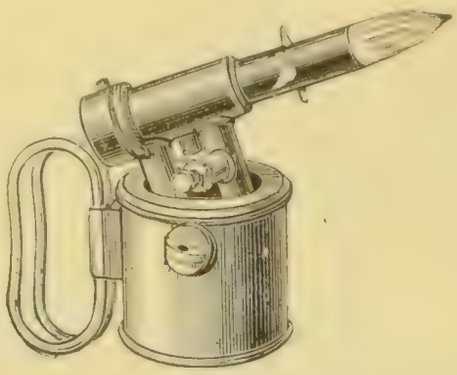
When the spirit in the saucer has been lit, any spirit remaining in the parts of the burner, this side of the valve will give a large flare, which will quickly disappear. When the burner is first lit up the flame will not at once burn quite steadily, but it will be perfect after a while. Such unsteadiness must not be mistaken for the irregular yellowish flame which appears if the burner has not been sufficiently warmed up ; in the latter case, turn the flame down a little till the burner is sufficiently heated and vapour forms steadily.

Regulation.—By the screw regulating valve the flame can be regulated large or small, but the flame should never be smaller than 1½ inch. To extinguish the burner, close the valve.

After continued use renew the wire gauze, which should always rest on the four spikes inside the tube. For a stronger flame take a wider mesh gauze.

Caution.—The perfect burning of Barthel's Patent Bunsen Burner depends upon the accurate size of the nozzle. All burners are sent out carefully tested, and all users are strongly cautioned against *increasing size of nozzle*, which is absolutely unnecessary and detrimental to the lamps.

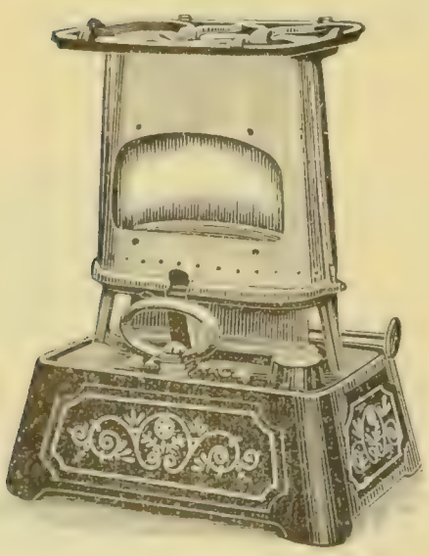
N.B.—As the flame of this Bunsen burner is of considerably greater heat than that of gas Bunsen burners, it is necessary, when heating vessels over wire gauze, to use none but iron wire gauze, brass will melt.



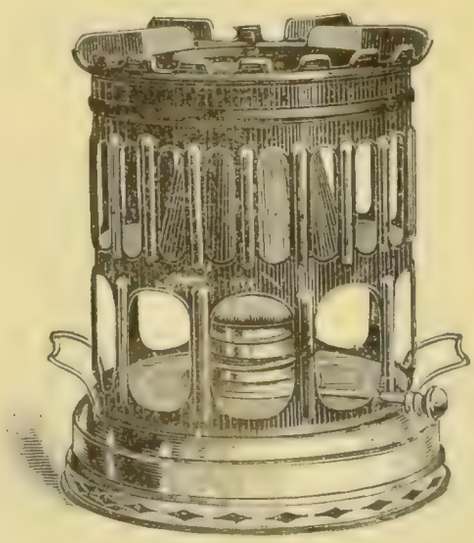
983H

983H **Lamp, the "Non-Explosive" Benzoline Blast,** will work to a temperature of 2,200° Fah., and is very economical, the cost of working being one half-penny per hour at the London price of Benzoline, it is made of substantial metal No. 18 B.W.G., can be held in any position, and reduced to the state of a glimmer—

No. 1 will work about one hour and a quarter...	...	£0	14	0
No. 2 „ one hour and three-quarters	...	0	17	0
No. 3 „ two hours and a quarter	...	1	0	0
No. 4, with two burners, will work about twelve hours		2	0	0



983C



983D

983C **Petroleum Oil Stove,** Japanned Iron, with Tin Chimney, Talc Window, and Stand for support of Sand Bath, Drying Ovens, &c.—

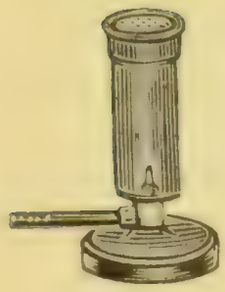
Size of Stand 7 × 5½ in., Height 10 in., complete £0 5 6

Extra Wick 1/6 per doz.

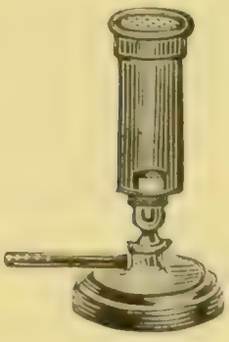
983D **Petroleum Oil Stove,** Circular Wick, central draught, can be worked with or without blast arrangement, very powerful for evaporating, &c. 1 1 0

LAMPS.

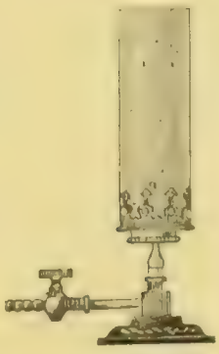
For Gas and Air, Argand and Gauze Burners.



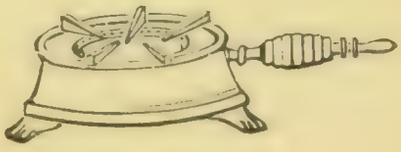
984



985



987A



988

984 **Gauze Gas Burner,** with Plain Jet, Gauze Cap, and Brass Chimney £0 5 6

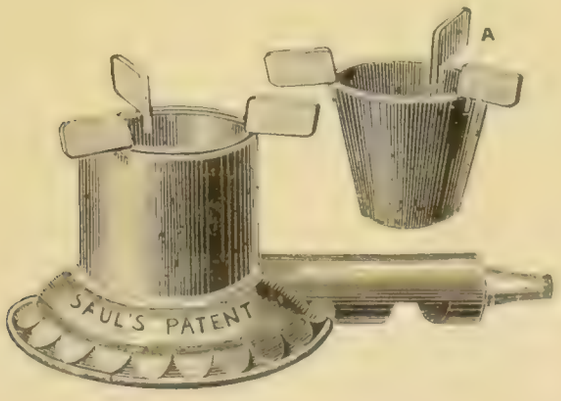
985 **Gauze Argand Gas Burner,** with Brass Chimney, 7/ and 0 8 6

986 „ „ „ „ Stopcock 8/6 and 0 10 0

987A „ „ with Stopcock, Clay Chimney and Iron Foot 0 5 6

988 **Gas Boiler,** Cast Iron, suitable for Evaporations—

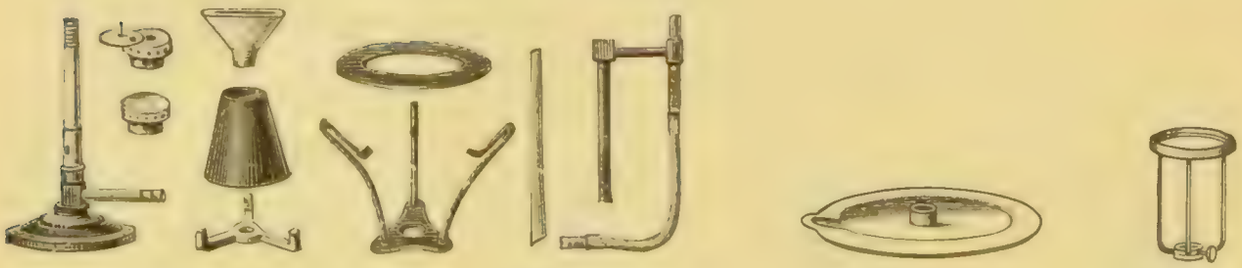
No. 1	2	3
2/6	3/	4/ each



988A

988A **Gas Boiler,** Saul's Patent, Cast Iron, indestructible. Inner compartment can be easily removed for cleaning. Consumption of Gas 2 ft. per hour ... ... each 3/ and £0 4 0

990A 995A



989 990 991 992 993 994 996 997A

989 **Bunsen's Gas Burner,** with Air Regulator, Brass Tube, and Solid Brass Jet, screwed to Iron Foot—

		Diameter of Burner ...	$\frac{7}{16}$	$\frac{5}{8}$	$\frac{3}{4}$ in.
	Best Make		1/3	2/	3/ each
989A	Made entirely of Brass		2	3/	— ,,
989B	Cheaper form, with Air Regulator and Ordinary Tube Jet		1/	1/6	2/ ,,
990	Brass Rose Burner, to fit		9d.	1/2	1/6 ,,
990A	,, ,, ,, with Moveable Top		1/	1/6	1/9 ,,
990B	Iron ,, ,, with Closed Top ...		6d.	9d.	1/ ,,
991	Star Support and Chimney		6d.	8d.	10d. ,,
992	Ring Support with Ring		1/	1/3	1/9 ,,
993	Plain Blowpipe Jet		3d.	4d.	6d. ,,
994	Herepath Blowpipe to fit, with Rubber Tube and Mouthpiece		2/6	2/9	3/ ,,

995A Flat Burner to fit $\frac{7}{16}$ in. Bunsen Burner, for bending Glass Tube ... ... each £0 1 0

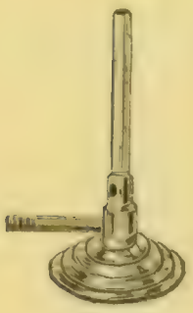
996 **Porcelain Ash Tray** for Star Support, to fit $\frac{7}{16}$ in. Bunsen's Burner .. .. each 0 0 9

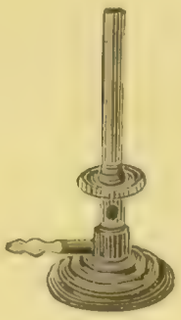
997 **Small Iron Crucible Jackets,** adapted to $\frac{7}{16}$ in. Bunsen's Burner ... ... per pair 0 1 3

997A Support for Crucibles, &c., to fit on $\frac{7}{16}$ in. Bunsen's Burner 0 0 9

All Bunsen's Burners can be supplied with Stopcock, 1/ each extra.


997B


998


999


1000

997B **Bunsen's Gas Burner,** new Pattern, with universal joint, can be used in any position, $\frac{7}{16}$ in. ... each £0 3 6

,, ,, ,, ,, $\frac{9}{8}$ in. ... ,, 0 4 6

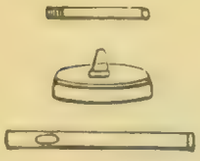
998 ,, ,, with Regulator, made entirely of Brass, best Nickel-plated, $\frac{7}{16}$ in. ... ... each 0 3 0

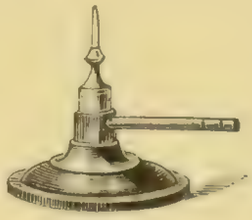
999 ,, ,, Improved, with regulating cone for keeping the supply of Gas and Air always in the same proportion, $\frac{7}{16}$ in. ... ... each 0 3 6

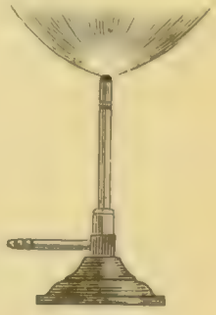
1000 ,, ,, Improved, with Sliding Tube and Adjusting Screw for raising or lowering the flame each 0 3 0


1003


1004




1004A


1004B

1003 **Bunsen's Burners,** Small, Brass, height 3 in., light make ... ... each £0 1 0

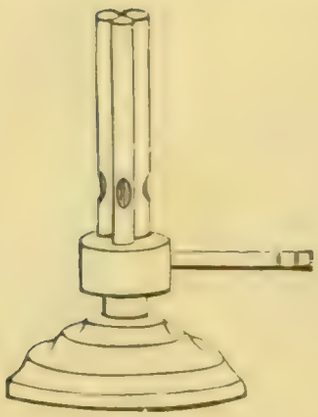
1004 ,, ,, Small, portable, in three pieces, diam. of Tube $\frac{5}{16}$ in. ... ... each 0 2 0

1004A ,, **Gas Burner,** for Brewers' Forcing Tray ... ,, 0 1 6

1004B **Gas Burner** (Batswing), mounted on Iron Stand for Glass Bending, or Bench light ... ... each 0 1 6

1005 **Asbestos Millboard,** for use on Hot Plate over Bunsen's Burner, &c., instead of Wire Gauze, Sand Dishes, &c., about $\frac{1}{8}$ in. thick—

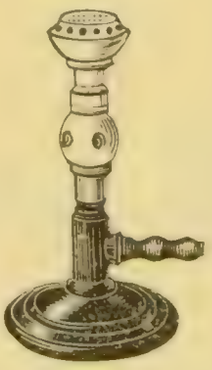
4 × 4	5 × 5	6 × 6	9 × 9	12 × 12 in.
2d.	3d.	4d.	6d.	9d. each



1006



1011



1012

1006 **Bunsen's Burners,** best make, with—

2	3	4	5	6 Tubes
4/	5/	6/6	8/6	10/ each

1011	,,	,,	Steatite Top on Iron Foot	each	£0	3	6
1012	,,	,,	Steatite Rose Top on Iron Foot ...	,,	0	5	0

Fletcher's Gas Burners (*See Fletcher's Special List*).

1013	**Oil Argand Lamp,** Japanned Tin	0	7	6
1014	**Davy's Wire Gauze Safety Lamp** ... ... 8/6 and	0	12	6



1015



1017



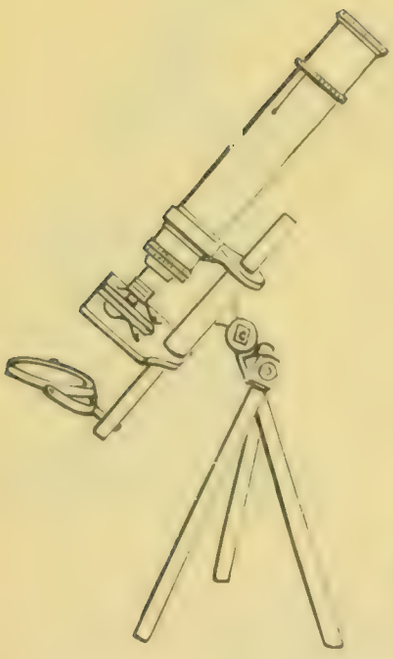
1018

1015 **Lamp Screen,** Stoneware, to steady flame of Spirit Lamp or Gas Burner—

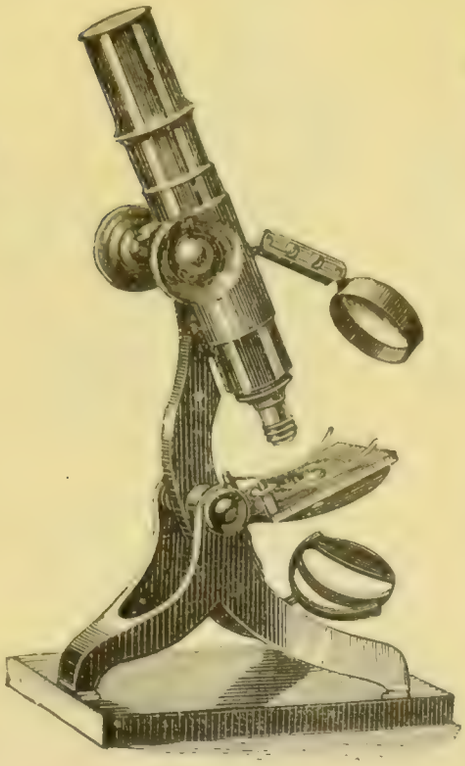
			Height 8 in., Diameter 4 in.	£0	1	3
			,, 9 in. ,, 5 in.	0	1	9
1016	,,	,,	Porcelain	0	2	6
1017	,,	,,	Sheet Iron, on Legs, with Supports for Sand Baths, &c. ... ... each 1/6, 2/, and	0	2	6

1018 **Zinc Screen,** for use with Tripod to steady flame of Gas Burners, Spirit Lamps, &c., 12 in. high 0 1 3

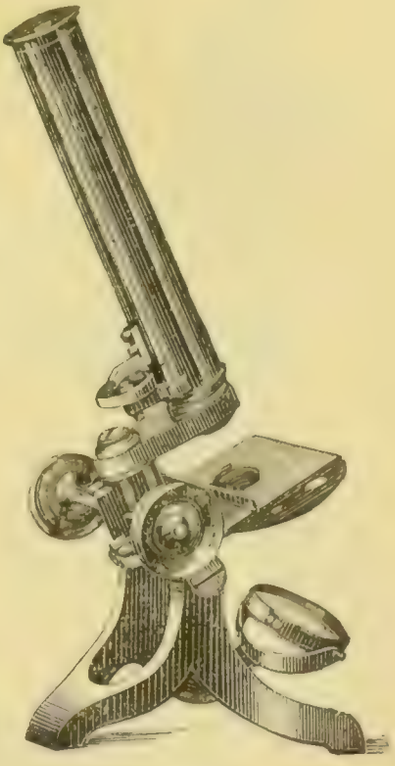
MICROSCOPES.



1020



1020A



1021

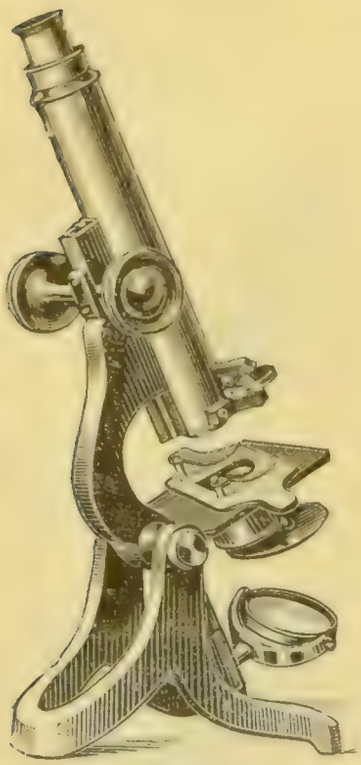
1020 **Microscope,** Cheap Portable, School, in Polished Mahogany Box, with Live Box and Forceps £2 2 0

1020A ,, For School use, with Condenser and Achromatic Lens, complete, in Polished Mahogany Box ... 2 5 0

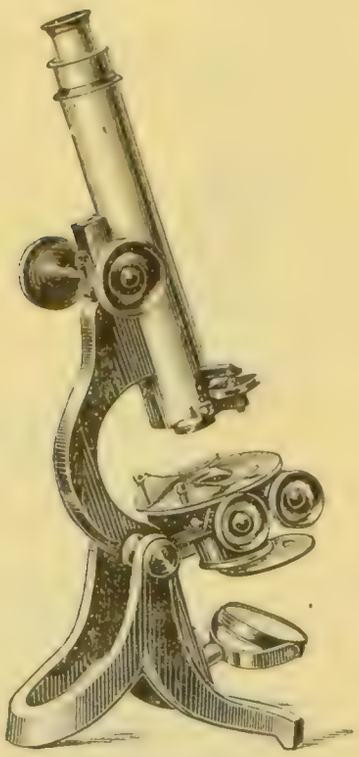
1020B ,, Pocket, with Sliding Tube, Coarse and Fine Motion, one Eye Piece, Brass Stage, Live Box and Forceps, set of Achromatic Lens, forming 1 in., $\frac{1}{2}$ in., and $\frac{1}{4}$ in., complete, in Morocco Leather Case, 6 in. by $2\frac{3}{4}$ in. by $1\frac{3}{4}$ in. ... 3 10 0

1021 ,, With Coarse and Fine Adjustment, $\frac{1}{4}$ in. Achromatic Lens to divide $\frac{1}{2}$ in. and 1 in., with Live Box and Forceps, in Polished Mahogany Box 2 17 6

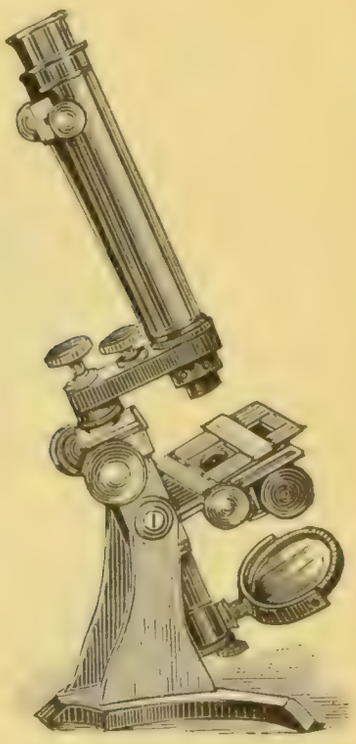
1022 ,, With Mechanical Stage, Coarse and Fine Adjustment Diaphragm, $\frac{1}{4}$ in. Achromatic dividing to $\frac{1}{2}$ in. and $\frac{3}{4}$ in., with Live Box, Forceps and Stand Condenser, in Polished Mahogany Case 5 5 0



1023

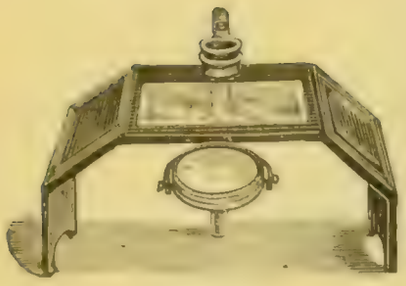


1025

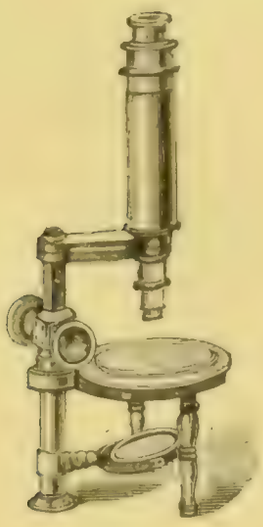


1030

1023	**Microscopes,** Monocular, with Universal Spring Stage, $\frac{1}{4}$ in. Achromatic Lens, dividing to $\frac{1}{2}$ in. and $\frac{3}{4}$ in. Diaphragm, Live Box, and Forceps, in Polished Mahogany Case ...	£5	0	0
1024	,, Do. with Circular Glass Stage	5	5	0
1025	,, Do. with B and C Eye Pieces, $\frac{1}{4}$ in. and 1 in. Achromatic Lens, Stand Condenser, Ball and Socket Joint, Live Box, and Forceps, in Polished Mahogany Case	7	0	0
1025A	,, Students' Histological, with Sliding Tube, Coarse and Fine Adjustment working well under High Powers, Glass Stage Plate, Plane and Concave Mirrors mounted on Adjustable Arm, with 1 in. and $\frac{1}{5}$ in. Objectives, Live Box, Forceps, and Condenser, in Polished Mahogany Case, complete	7	7	0
1025B	,, Petrological, with Best Quality Rack Fine and Coarse Adjustment, Concentric Brass Stage divided to 360°, accurately centred to Optical Axis of Body, Improved Polarizing Apparatus with Rim of Polarizer divided (the Analyser being made to slide through the Body, in the same way as Binocular Prisms, and Klein's Quartz Plate mounted in the same way), Spider Line Eye Piece, with 1 in. and $\frac{1}{4}$ in. Objectives, Forceps, and Stand Condenser	12	10	0
1026	,, Large size, Mechanical Stage, B and C Eye Pieces, Polarizing Apparatus, Spot Lens, Stand Condenser, Ball and Socket Joint, Diaphragm with $\frac{1}{4}$ in. and 1 in. Achromatic Lenses, Live Box and Forceps, in Polished Mahogany Case	15	0	0



1026A



1026C

1026A **Microscope,** Dissecting, on Iron Stand, Glass Stage £0 16 6

1026B ,, ,, with Rackwork Adjustment 1 1 0

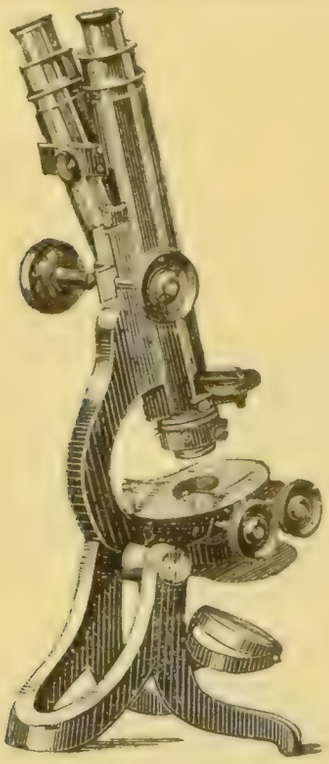
1026C ,, ,, Brass Stand, Circular Glass Stage 4 in. diameter, with ¼ in., ½ in., and 1 in. Powers, in Polished Mahogany Case 3 5 0

1026D ,, Dissecting, the Arm is made in two portions, the lower half carrying the Objectives, is fixed, the upper half having the Body, can be turned on its centre so that the Objective can be used alone, converting it from a Compound to a Single Microscope, with Eye Pieces and Two Sets Achromatic Lenses 1 in. and 2 in., in Polished Mahogany Case 3 15 0

Double Nose Piece for above 0 15 6

1026E ,, Portable Dissecting, with Rack Adjustment, Concave Mirror, Glass Stage Plate, Three Lenses 3 in., 2 in., and 1 in., Three Knives, Scissors, and Forceps, complete in Polished Mahogany Box 3 3 0

1030 ,, Binocular, with Coarse and Fine Adjustment, Universal Spring Stage, Diaphragm. ½ in. Achromatic Lenses, dividing to 1 in., Live Box and Forceps, in Polished Mahogany Case 6 10 0

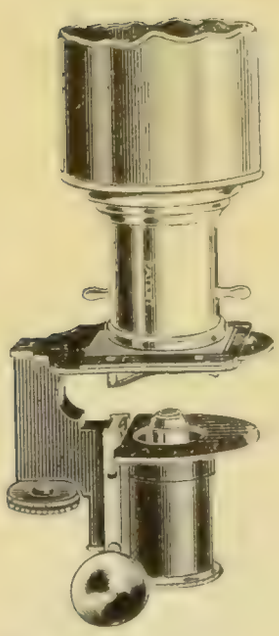


1031

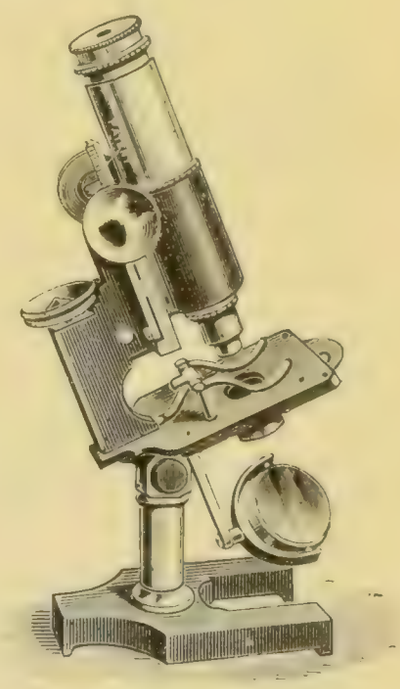
1031 **Microscope,** Binocular, Mechanical Stage, $\frac{1}{4}$ in. and $\frac{1}{2}$ in. Achromatic Lens, dividing to 1 in., Plane and Concave Mirrors, Stand Condenser, with Ball and Socket Joint, Live Box and Forceps, in Polished Mahogany Case ... £10 0 0

1032 ,, Binocular, Large Size, with Coarse and Fine Adjustment, Mechanical Stage, Two Pairs Eye Pieces, Polarizing Apparatus, Spot Lens, Diaphragm. $\frac{1}{4}$ in. and $\frac{1}{2}$ in. Achromatic Lenses, dividing to 1 in., Plane and Concave Mirrors, Stand Condenser, with Ball and Socket Joint, Live Box and Forceps, in Polished Mahogany Case ... 18 10 0

Microscopes of Higher Power to order.



1032A. Fig. 1.



1032A. Fig. 2.

1032A 1. Microscope Attachment for use with Lantern, fitted with Spiral Rack and Pinion Coarse Motion, and first-class Screw, Fine Adjustment Concave Parallelising Lens, One Subcondensing Lens, One Carrier for Objective, Diaphragm, and Improved Object Clip, as per Fig. 1 ... £4 17 6

2. Table Stand, with Flat and Concave Mirrors on Swinging Arm, Body with Draw Tube and One Eye Piece, Brass Foot and Pillar, with Joint for inclining Instrument at any angle, full size Sub-stage Fitting for Apparatus, forming a complete Student's Instrument, as per Fig. 2 extra 2 7 6

3. Micro-Polarising Apparatus, having facilities for giving both Prisms an entire revolution. (*This does not include the Nicol's Prisms*) 1 17 6

4. Polished Mahogany Case, with Lock, Key, and Handle, to hold the above forms of Instrument 0 15 0

Amplifying Lens, for use with Lantern form of Instrument 0 10 6

Ditto, Photo-Micrography 1 1 0

Alum Trough, for keeping Heat Rays from injuring Objects from 0 6 6

Improved Glass Troughs, for exhibiting Pond Life, from each 0 1 6

Specially constructed Lamp with Reflector, for giving small Discs of 18 in. with the 1 in. 0 12 6

1033 **English Objectives,** in Brass Boxes, First Series—

Nominal focus. Inches.		Angular Aperture.						
3	...	12 degrees	...	...	..	...	1	8 6
2	...	15 ,,	...	...	...	...	1	8 6
1½	..	20 ,,	...	...	...	...	1	8 6
1	...	27 ,,	...	...	...	...	1	8 6
½	...	50 ,,	(for Binocular)		...	...	1	15 0
4/10	...	75 ,,	...	...	...	...	1	15 0
¼	...	90 ,,	...	...	...	...	1	9 6
⅕	...	90 ,,	...	...	...	...	1	9 6
⅙	..	90 ,,	...	...	...	...	1	17 6
⅛	...	140 ,,	(with Adjustment)			.	3	15 0
1/10	...	140 ,,	...	...	...	...	5	0 0

1033A **English Objectives,** in Brass Boxes, Second Series—

Nominal focus. Inches.		Angular Aperture.						
1	...	25 degrees	...	...	..	...	1	5 0
⅔	...	30 ,,	...	...	...	...	1	7 6
½	...	40 ,,	...	...	...	...	1	8 6
¼	...	75 ,,	...	...	...	...	1	8 6
⅕	...	80 ,,	...	...	...	...	1	9 0
⅙	...	80 ,,	...	...	...	...	1	10 0
⅛	...	120 ,,	...	...	...	...	2	10 0
1/10	...	130 ,,	...	...	...	...	2	17 6

1033B **Immersion Lenses,** $\frac{1}{12}$th Water, 170° £3 17 6

" " $\frac{1}{12}$th Oil, 1·26 N.A. 5 0 0

" " $\frac{1}{15}$th Oil, 1·26 N.A. 5 17 6

Zeiss & Leitz and other makers' Objectives supplied to order.

1034 **Dividable Objectives,** in Boxes—

1 in. and 2 in., $\frac{1}{2}$ in. and 1 in., $\frac{1}{4}$ in. and 1 in. 1 5 0

1035 **Eye Pieces** ... ... each from 7/6 to 0 15 0

1036 **Spot Lenses** ... ... " 10/6 to 1 5 0

1037 **Stand Condensers** 0 7 6

1037A " " with Ball and Socket Joint, each 10/6, 12/6 & 0 15 6

1037B **Polarizing Apparatus** 1 1 0

1037C **Live Boxes** ... ... 3/ & 0 3 6

1037D **Camera Lucida,** "Wollaston's" 0 10 6

1038 Thin Glass Squares, for Mounting Microscopic Objects—

Nos.	1	2	3 quality
	4/	3/6	3/ per oz.
Circles	5/	4/	3/6 "

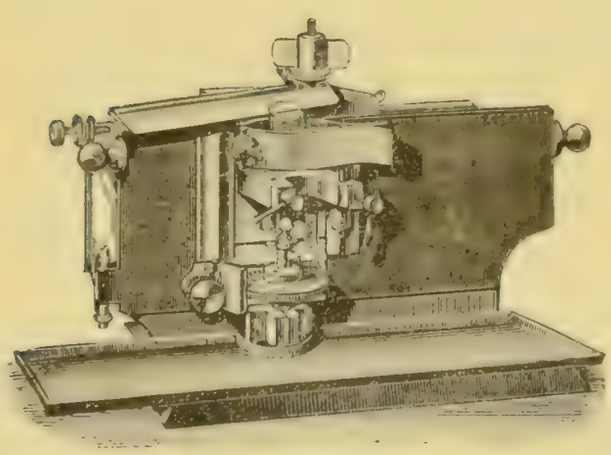
1039 **Microscopic Slides,** 3 in. × 1 in., with Ground Edges—

Crown ... ... 3/6 per gross

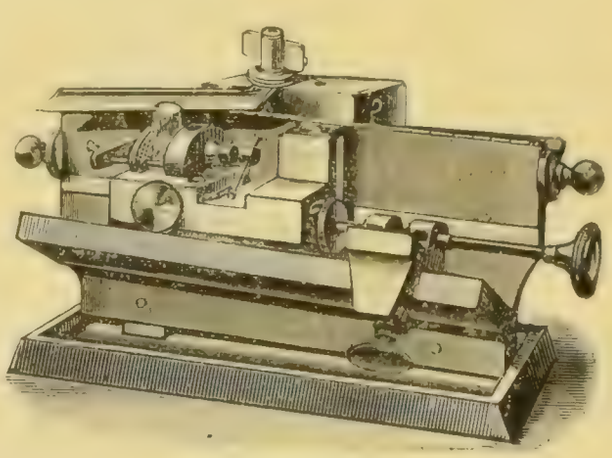
Patent Plate ... ... 5/ "

Extra Thin White ... ... 6/6 "

1040 " with Cavities .. .. 15/ "



1040A



1040B

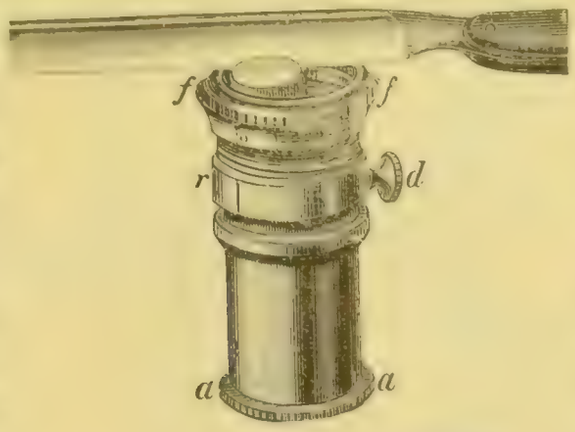
1040A **Microtome,** Patent Sliding, with Two Knives in Case, 12 to 13 cm. in length £7 10 0

In this instrument the object is on the back stroke of the knife, automatically raised in vertical direction by a Micrometer Screw to a height varying at pleasure between 0·003 and 0·020 of a millimetre, the operator is thus enabled to cut any number of uniform slices. The slide and body are made of cast iron, the guiding part of knife carriage of steel.

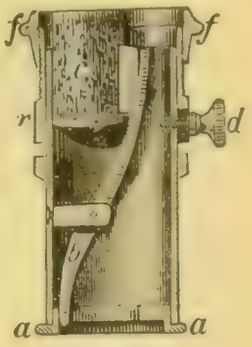
1040B **Microtome,** Patent Sliding, with Incline on "Rivet" Model. The Knife and Object Carriage are supported at five points. Length of Slide of Knife Carriage 25 cm., all parts of Body are Nickelled, complete with 2 Knives 12 to 13 cm. in length £6 6 0



1040C



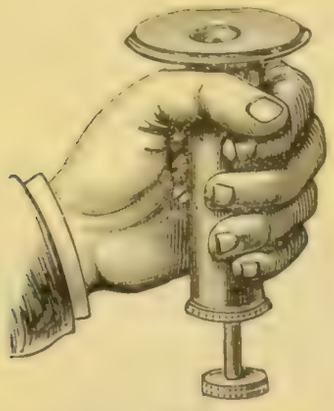
1040D



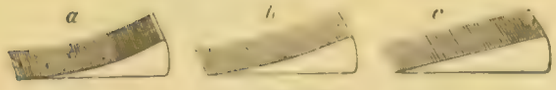


1040C **Microtome,** Williams', Circular, for use with Freezing Mixture of Ice and Salt £3 10 0

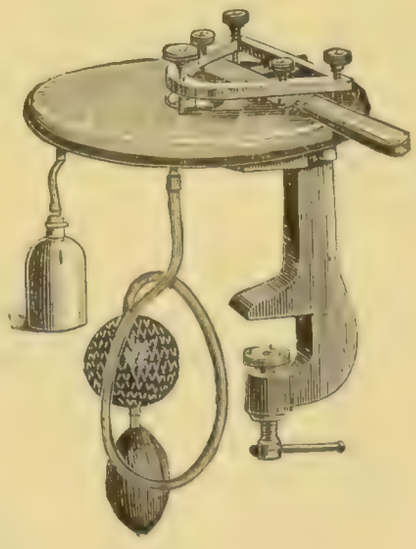
1040D ,, For hand use 1 10 0



1040E



1040F



1040K

1040E **Microtome,** for hand use £1 8 6

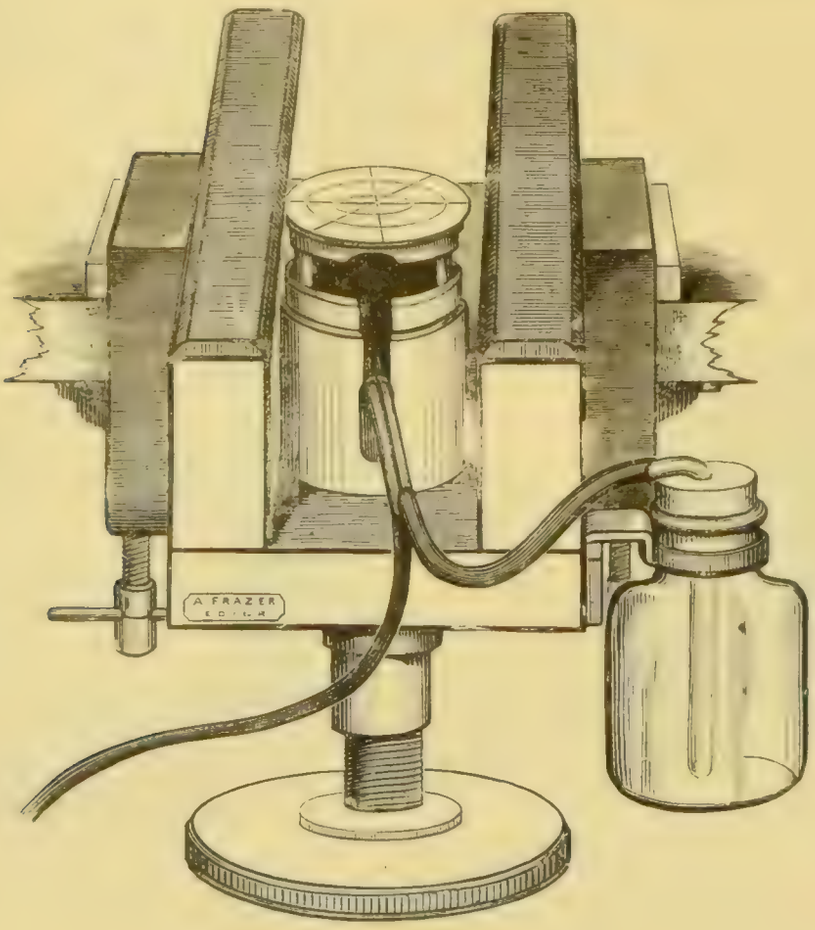
1040F **Knives** for use with Microtomes; *a* for soft objects, *b* for medium, *c* for hard and frozen, 13 cm. long ... each 0 10 6

1040G **Microtome,** Brass, for fixing to table 1 7 6

1040J ,, Cambridge pattern... ... ... 5 5 0

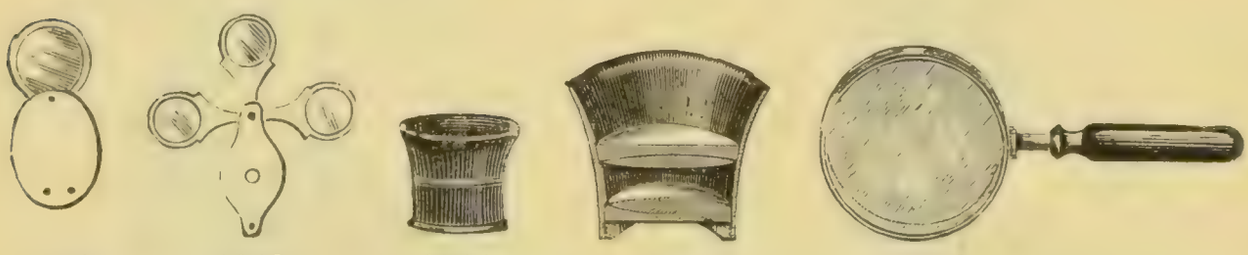
1040K ,, Grove's modification of Williams', for use with Ether Spray 5 0 0

1040L ,, Ice Chamber for above 1 15 0



1040H

1040H **Microtome,** Cathcart's, with Freezing Apparatus £1 1 0



1041 1042A 1044 1044A 1046

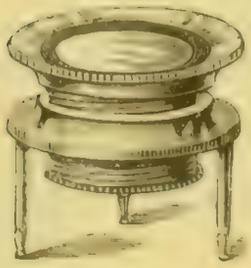
1041	**Magnifying Lens,** in Horn Case	£0	1	0
1042	,, ,, Double, for examining Crystals, &c., or in Blowpipe Operations, mounted in Horn or Vulcanite	0	2	6
1042A	,, ,, Triple	0	3	6
1043	,, ,, Mounted in Ebonite, $1\frac{5}{8}$ in. diam.... ...	0	1	6
1044	,, ,, Watchmakers'	0	1	0
1044A	,, ,, ,, Double Lens, more powerful	0	1	6

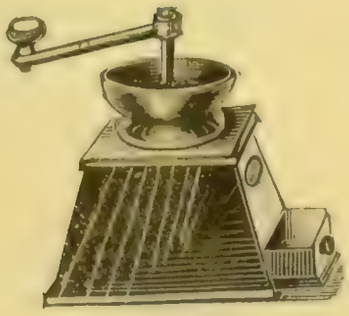
1046 **Reading Lenses,** Mounted in Polished White Metal and Blackwood Handle —

$2\frac{1}{8}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	4	$4\frac{1}{2}$	$4\frac{3}{4}$ in. diam.
1 9	2 9	4/	5/	5 6	7/	8/ each


1046A


1046B


1046C


1047

1046A **Magnifying Lens,** Coddington, Brass Nickel Plated, with Wood Handle, $\frac{13}{16}$ in. £0 4 6

1046B ,, ,, Stanhope, for Botanists, mounted in German Silver, $\frac{1}{2}$ in. 0 4 6

1046C ,, ,, with 2 plano-convex Lenses, $1\frac{9}{16}$ in. diam., mounted on Brass Frame with Legs... 0 3 0

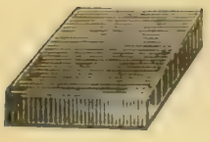
1047 **Mill,** Small, Steel, with drawer, for grinding samples to be tested 0 4 6

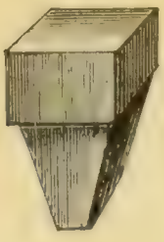
,, with Flange 0 6 6

,, ,, and Fly Wheel 0 12 6

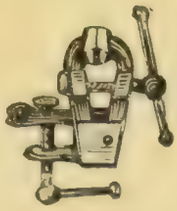
Larger sizes made to order.

METALLURGICAL APPARATUS AND TOOLS
used in Assaying, &c.


1048


1049


1050


1053


1055

1048 **Anvil,** Hardened Steel, for Blowpipe Experiments, $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$ in. £0 1 0

1048A ,, for flattening beads of Gold or Silver, 4 × 4 × 1 in.... 0 5 6

1049 **Anvil or Stake,** Assayers', for flattening large beads of Gold or Silver, surface $3\frac{1}{2} \times 3\frac{1}{2}$ in., with fang 0 18 6

1049A ,, smaller, $1\frac{1}{2} \times 1\frac{1}{2}$ in. 0 3 6

1050 ,, length end to end 5 in. 0 2 6

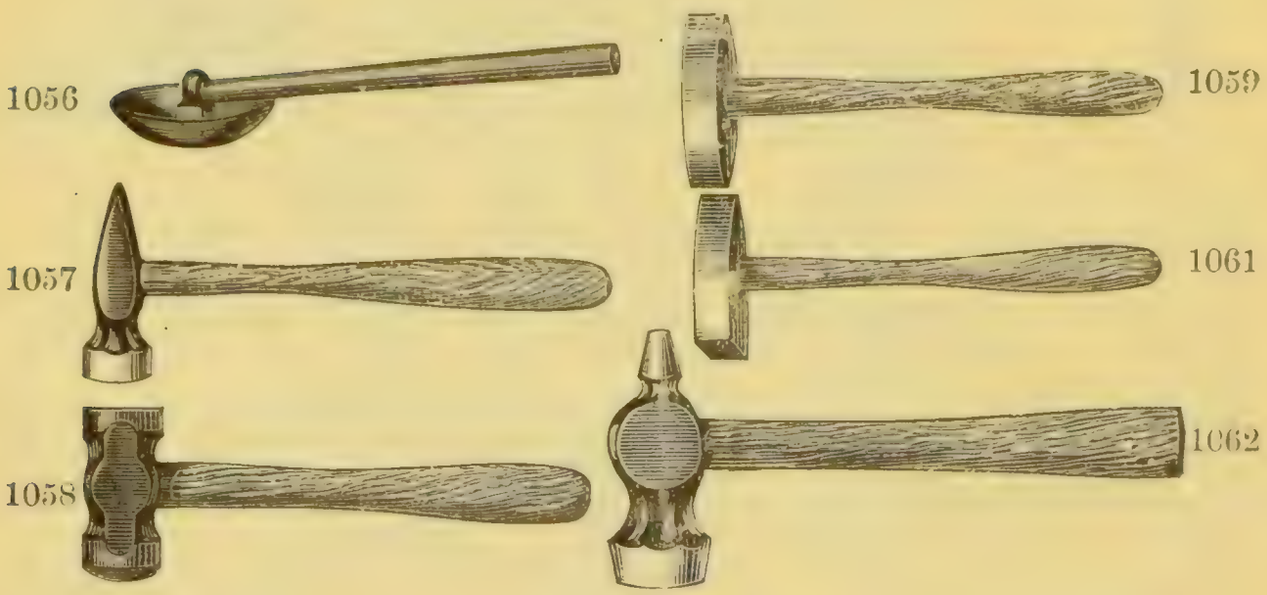
1052 **Vice,** Watchmakers', to hold small articles in the hand ... 0 6 6

1053 ,, to screw to table 0 6 6

1054 ,, stronger, ditto ... ... 8/6, 10/6 and 0 15 6

1055 **Chisels,** for cutting metals 0 1 6

HAMMERS, ASSAY, &c., with Ash Wood Handles.



1056 **Hammer,** Bucking, diameter about 8 in., weight about 14 lbs., with handle ... ... each £0 10 6

1056A **Bucking Plate,** Cast Iron, for above, 24 × 14 in. 2 10 0

1057 **Hammer,** Geological, steel end, pointed head—

3 × 1 in.	4 × 1½ in.	6 × 1½ in.
2/3	2/6	4/6 each

1058 ,, Flattening, for buttons, one end flat, the other round—

3 × 1½ in.	4¼ × 1¾ in.
2/6	3/ each

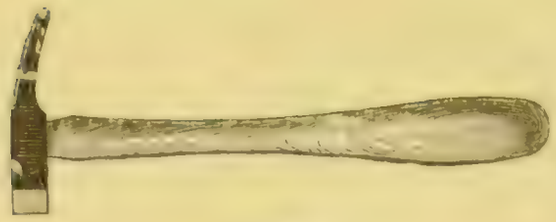
1059 ,, Chisel ends—

3 in.	4 in.
2/3	2/6 each

1061 ,, Geological, square face, chisel end—

3 × ¾ in.	4 × 1 in.	8 × 1¾ in.
2/3	2/6	6/6 each

1062 ,, Riveting, end taper or rounded, 5 × 1½ in. ... each £0 3 6



1062A

1062A **Hammer,** Geological, square faced, with pick end, length 6¾ in., face 1 × 1 in. £0 4 0

1062B **Mining Picks,** handled ... ... each 3/6 and 0 4 6



1063



1064

1063 **Vanning or Miners' Shovels** ... ... each £0 5 6

1064 **Mallet,** Boxwood ... ... „ 0 2 0

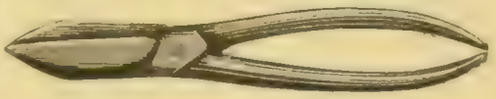
1065 „ „ polished ... ... „ 0 2 6



1066



1067



1068

1066 **Plyers,** Steel, square nosed ... ... 1/ and £0 1 6

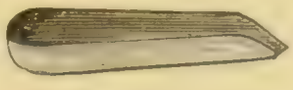
1067 „ Cutlers' Steel, for cutting Metals, Wire, &c. ... 2/6 „ 0 3 0

1067A **Tweezers,** for holding Prills, to remove Bone Ash .. each 0 2 0

1068 **Shears,** for cutting Metals ... ... 8 in. 2/6, 10 in. 0 3 6



1069



1070



1071

1069 **Copper Assay Scoops,** in Wood Handle—

Length of Metal	5	6	8	10	12 in.				
	3/6	4	4/6	5/6	7/ each				
1070 **Horn Scoops**						each	£0	0	6
1071 **Scratch Brushes**						„	0	1	6
„ larger						„	0	2	0

1071A	**Brushes,** Hard Unbleached, for cleaning Prills ... each	£0	0	10
1071B	**Chamois Leathers,** best quality ... each 2 , 2 6 and	0	3	6
1071C	**Scissors** ... ... each 1/6 and	0	2	0
2245	**Cups or Dippers,** for Mercury, Enamelled, with Iron Handle, about 8 oz. capacity ... ... each	0	1	3



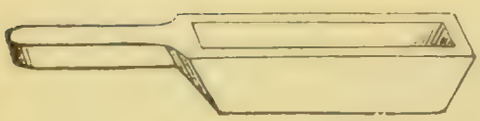
1072



1074



1076



1079



1080

1072	**Ingot Mould,** Conical form, with Foot	£0	1	6
1073	,, Turned Inside	0	3	0
1074	,, Double	0	2	6
1075	,, ,, Turned Inside	0	4	6
1076	,, Turned and Polished Steel, 2 Holes, with Handle	0	5	0
1077	,, ,, ,, 4 ,, ,,	0	10	0
1078	,, Cast Iron, for Small Bars, $4\frac{1}{4} \times 1\frac{1}{2} \times \frac{1}{2}$ in. ...	0	0	10
1079	,, ,, for Bars, 6 $\times 1\frac{7}{8} \times 2$ in.	0	1	9
	,, $7\frac{3}{4} \times 1\frac{7}{8} \times 2$ in.	0	2	6
	,, $9\frac{3}{8} \times 2\frac{5}{8} \times 2$ in.	0	4	0
1080	,, ,, with divisions, each division $4 \times 2\frac{3}{8} \times 2\frac{1}{2}$ in.	0	4	6



1081

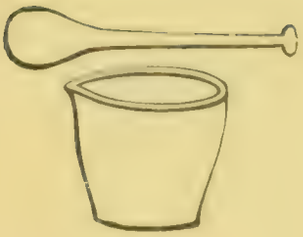


1082



1084

1081	**Mortars,** Hardest Polished Steel, for Crushing Minerals, Diameter of Pestle $\frac{3}{8}$ in.	£0	6	6
1082	,, ,, in 3 Pieces ,, ,, $\frac{5}{8}$,,	0	16	0
1083	,, ,, ,, ,, ,, $1\frac{1}{8}$,,	1	6	0
1084	,, ,, Mounted in Gun Metal on Broad Base, $\frac{5}{8}$,,	0	16	0
1085	,, ,, ,, ,, $1\frac{1}{8}$,,	1	6	0



1087



1088



1089

1087 **Mortars and Pestles,** Iron, Bowl Shaped, Stout, Turned Inside—

Outside diam.	4	4½	5	6¼	7¼	7¾	8½ in.
	2/3	3/6	4/	5/	6/6	8/6	9/6 each

1088 **Mortars and Pestles,** Iron, Bell Shaped, Turned Inside—

Outside diam.	4	4½	5½	6½	8	10	12	15 in.
	1/6	2/3	4/	5/	7/	11/	15/	30/ each

1089 **Mortars and Pestles,** Wedgwood Ware, Pestle with Wood Handle—

Number	000	00	0	2	3	4	5	6	7	8	10
Outside diam.	3	3½	4	5	6	6½	7	8	9	10	12 in.
	1/1	1/3	1/5	1/10	2/	2/6	3/	3/9	5/	7/9	10/6 each



1091



1092



1093



1095

1091 **Mortars and Pestles,** Berlin Porcelain, Glazed outside, Biscuit Porcelain inside—

Outside diam.	2	2¾	3½	4½	5½	6¾ in.
	8d.	1/6	2/6	3/3	4/3	5/6 each

1092 **Mortars and Pestles,** Dresden Porcelain, Shallow, Glazed inside and out, for Organic Analysis—

Diam.	2¾	3¼	4¼	5⅛	6	7¼	8¾ in.
	1/9	2/	2/6	3/6	4/6	5/6	8/ each

1093 **Mortars and Pestles,** German Porcelain, Glazed outside—

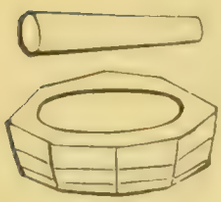
2½	3⅛	3½	4¼	5⅛	6	7	8 in. diam.
4d.	6d.	9d.	1/	1/6	2/	2/6	3/ each

1094 **Mortars and Pestles,** Composition, shallow, strong, as Fig. 1092—

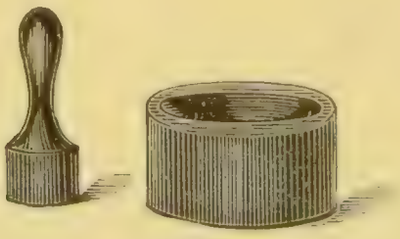
3½	4¼ in. diam.
10d.	1/ each

1095 **Mortars and Pestles,** stout White Glass—

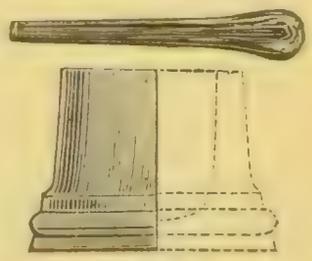
2¾	3¼	4½	5½	6½	7¼ in. diam.
8d.	9d.	1/	1/4	2	2 9 each



1096



1097



1098

1096 **Mortars and Pestles,** Agate, highly polished, for analytical use and pulverization of hard substances—

1 3/16	1⅜	1¾	2	2¼	2½	2¾	3 in. diam.
2/6	3/	3 9	4/6	5 6	7/6	9/	12/ each

3 3/16	3½	3¾	4	4⅜	4⅞	5	5¼	5½ in. diam.
14/	18	20/	25/	30/	40/	50/	60/	70/ each

1097 **Mortars and Pestles,** Strong Cast Iron, Barry's. Heavy Pestle. with flat surface, 2⅜ in. diameter, specially adapted for crushing and reducing to powder mineral substances, &c.; diameter of Mortar 4¾ in., height 2¾ in. £0 3 6

1098 **Mortars and Pestles,** Cast Steel, for Assayers, &c.—

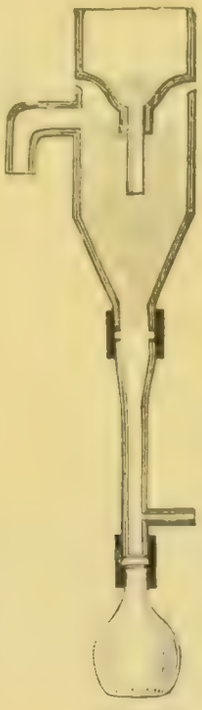
Height 6 in., diam. 6 in., weight about 30 lbs., each								0	18 6
,, 8	,,	7	,,	,,	,,	40	,,	,,	1 5 0



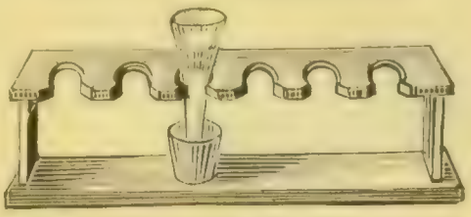
1098A

1098A **Patent Ore Pulverizer,** the Panklast, which will crush the hardest substances to any degree of fineness. It is easily regulated by a sliding bearing in the pedestal for any degree of fineness. Can be easily taken to pieces for transit. Weight 65 lbs. £5 10 0

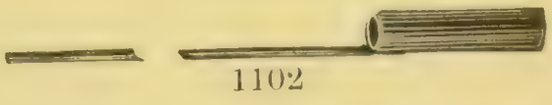
1098B **Patent Ore Pulverizer,** No. 2, for steam power 32 0 0



1100



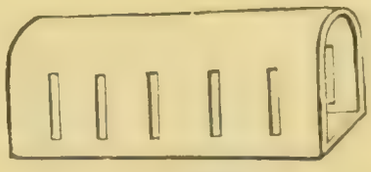
1101



1102



1099



1103

1099 **Mortar Amalgamator,** Solid Cast Iron, 9 in. diameter, turned inside £3 0 0

1100 **Assay, Spitz Lutte,** for Washing and Concentration Test, 5 in. diam., Strong Zinc, complete 0 16 6

1101 **Turning-out Rack,** Teak, for Gold Assay, for 6 flasks ... 0 3 6

1102 **Tester,** useful for taking Samples from heaps, Iron Rod ½ in. diam., length, end to end, 3 ft., welded on to strong Sheet Iron Cylinder 8 in. by 1¼ in. diam., end sharpened ... 0 3 0

1103 **Muffles, Fire Clay,** for Cupelling—

Number	A	B	C	D	E	F	G	H	I	K	
Length	7	7½	8	8½	9	10	11	10½	12	14	inches
Width	3½	4⅜	4¾	5	5½	6	4	5¼	6	8	,,
Height	2½	2⅞	3	3¼	3⅝	4	3⅛	3⅞	4	5	,,
	1/9	2	2/6	2/9	3/3	3/6	2/9	3/3	4/	6/	each

Salamander and other sizes made to order.

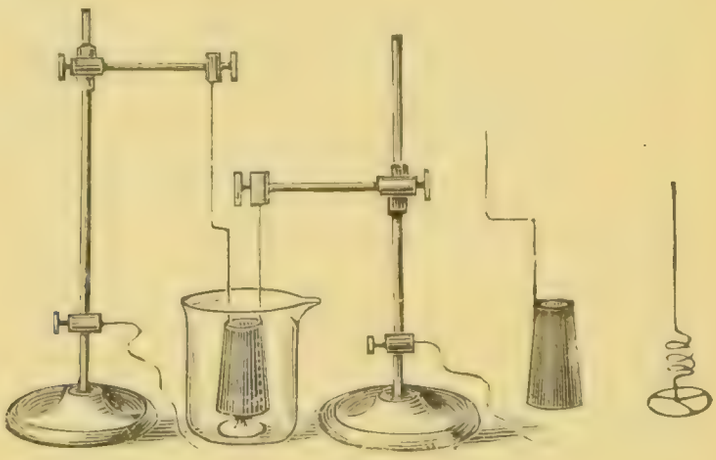
1103A Paper, Black Glazed, for Sampling ... ... Ream 20/, Quire 1/3

1104





1105



1106

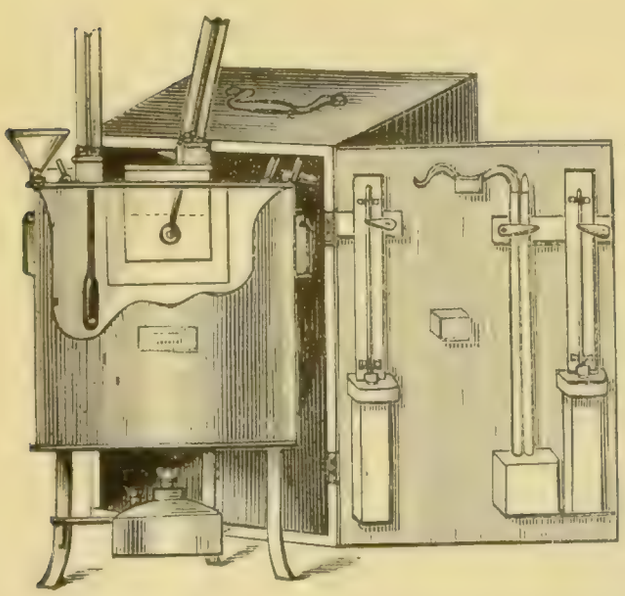
1104 **Buckets,** Iron, Enamelled Inside for Mercury, Japanned Red Outside—

Diam. at Top	6	8	9	10 in.
	4/	5/	6/	7/ each

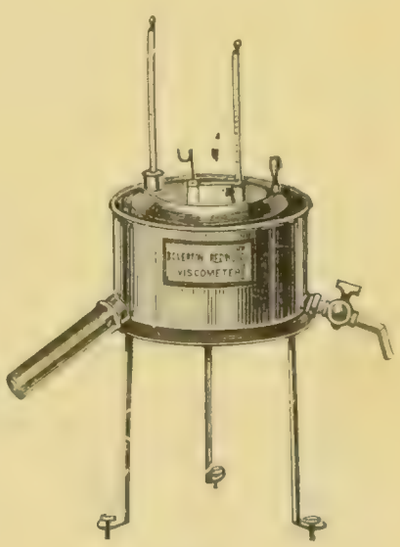
1105 **Sheet Iron Gold Washing Basins**—
16 in. diam., $2\frac{3}{4}$ in deep ... ... each £0 2 6

1106 **Apparatus for Electrolytic Estimation of Copper,** as arranged by Dr. A. Classen, Platinum Cone $2\frac{1}{2} \times 1\frac{1}{2}$ in., with Wire attached and Platinum Spiral, depending upon size and weight of Platinum, the set, about ... 5 0 0

Brass Stands, with Support and Screws ... ... each 0 4 6



1107



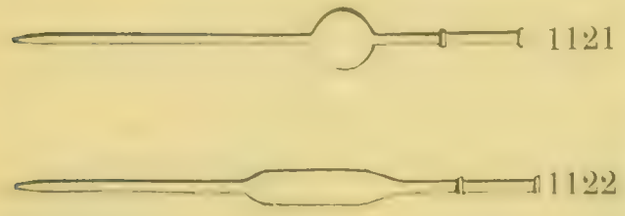
1107A

1107 **Board of Trade Official Petroleum Test Apparatus,** Petroleum Act, 1879, complete in Polished Mahogany Case, with fittings £5 5 0

For use with Oil or Gas combined ... ... extra 0 10 6

Board of Trade Fee for Stamping, for Gas or Oil ... 0 5 0

1107A **Boverton Redwood's Viscometer,** Standardised for the Determination of the Viscosity of Lubricating Oils, adopted by several Railway Companies as the basis of Contracts, complete with printed instructions for use £4 10 0



1121

1122



1123



1123A



1124



1125



1126

1121 **Pipettes or Dropping Tubes,** Bulb—

2d. 3d. 4d. 6d. each
1/6 2/ 3/ 4/ per doz.

1122 „ „ Cylindrical— each 3d., 4d., 6d., and £0 0 9

1123 **Dropping Bottle,** Rauvier's— 15 30 50 c.c.
9d. 10d. 1/ each

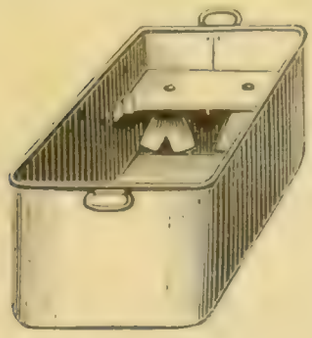
1123A „ Patent, with Slot in Stopper, 30 and 60 c.c. each 0 0 6

1124 **Pipette or Dropping Bottle,** with Vulcanized Rubber Top „ 0 0 6

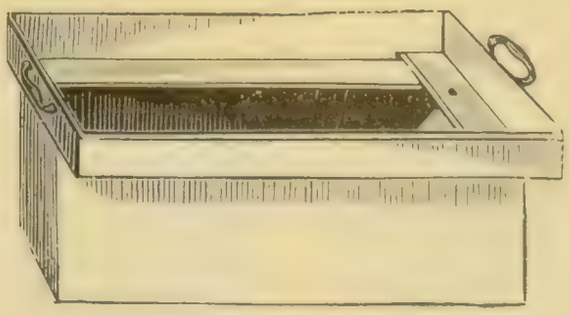
1125 „ „ „ Schuster's Stoppered „ „ 0 0 6

1126 **Pipette, Gas,** Ettling's ... ... each 1/6 and 0 2 0

PNEUMATIC TROUGHS.



1127



1128

1127 **Pneumatic Troughs,** Japanned Tin, Black Outside, White Inside, with Moveable Shelf—

Capacity	Length	Width	Height				
1 gallon	10 inches	6¼ inches	6 inches	...	£0	2	9
2 „	11½ „	8¾ „	6½ „	...	0	3	9
4 „	13 „	9¾ „	9¾ „	...	0	5	3
6 „	15½ „	12 „	12 „	...	0	8	0

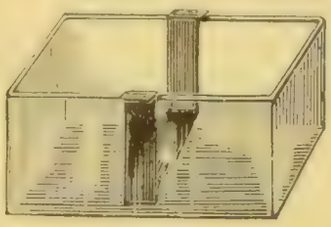
1128 **Pneumatic Trough,** Japanned Tin, with Side Shelves and Slide, 14×8×6 in. £0 4 6

1129 **Pneumatic Troughs,** Japanned Tin, with Side Shelves and Moveable Shelf, White Japanned inside, as Fig. 1128—

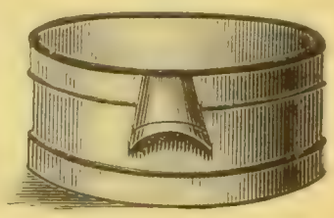
Length		Width		Height				
17 inches	...	12 inches	...	7½ inches	...	0	7	6
21 ,,	...	12 ,,	...	7½ ,,	...	0	8	6
24 ,,	...	14 ,,	...	8½ ,,	...	0	12	0



1130



1131



1132

1130 **Pneumatic Troughs,** Stout Bohemian Glass, Rectangular—

Length		Width		Height				
8¼ inches	...	4¼ inches	...	4¼ inches	...	£0	6	0
10¼ ,,	...	5 ,,	...	5 ,,	...	0	8	0
12½ ,,	...	6¼ ,,	...	6 ,,	...	0	13	0
15 ,,	...	7½ ,,	...	6½ ,,	...	0	17	0

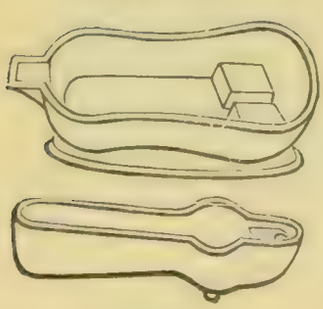
1131 **Pneumatic Troughs,** Edges and Sides Cut and Polished—

Length		Width		Height				
8¼ inches	...	4¼ inches	...	4¼ inches	...	0	10	6
10¼ ,,	...	5 ,,	...	5 ,,	...	0	15	6
12½ ,,	...	6¼ ,,	...	6 ,,	...	1	4	0
15 ,,	...	7½ ,,	...	6½ ,,	...	1	10	0
Brass Sliding Shelf to fit			...	...	extra	0	3	6

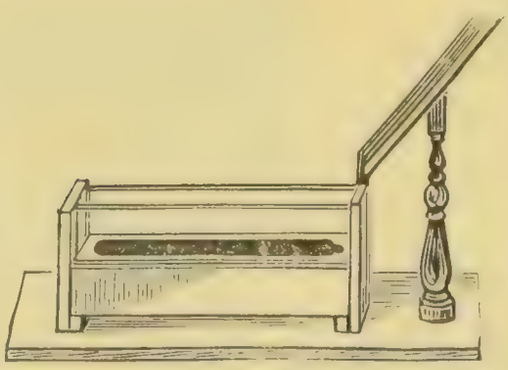
1132 **Pneumatic Troughs,** Brown Stoneware, Round—

Diameter		Height					
9 inches	...	3 inches	...	...	0	1	6
12 ,,	...	5½ ,,	...	...	0	3	0
16 ,,	...	6 ,,	...	...	0	5	6

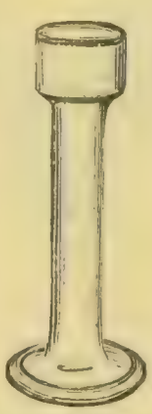
1134



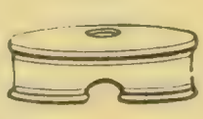
1133



1136



1137



1138

1133 **Pneumatic Troughs for Mercury,** Porcelain, to contain 4 lbs. mercury £0 1 6

1134 ,, ,, ,, ,, 10 lbs. ,, 0 5 6

1136 **Bunsen's Pneumatic Trough for use with Mercury,** consisting of Solid Mahogany Trough with Plate Glass Sides, and Frame for supporting Eudiometer; internal measure, 14 in. × 3 in.; requires about 20 lbs. mercury to cover the shelf, and 45 lbs. to fill it entirely £1 10 0

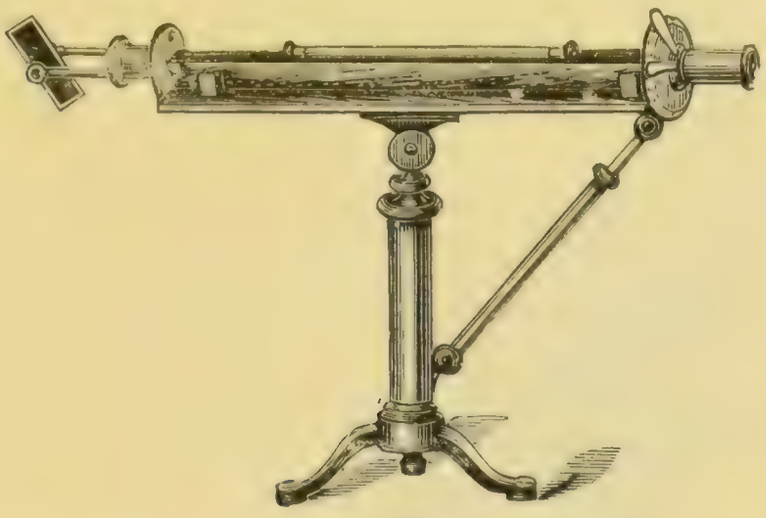
Do. do. Blackwood 1 7 6

1137 **Pneumatic Troughs,** Glass, Vertical, for Tube Operations—

Height	Diameter	Width at Mouth			
8 inches ...	2 inches ...	3 inches ...	0	1	0
12 „ ...	2 „ ...	3 „ ...	0	1	2
12 „ ...	2½ „ ...	3 „ ...	0	1	4
16 „ ...	2½ „ ...	3½ „ ...	0	2	6

1138 **Pneumatic Trough Shelves,** Earthenware (Beehive Shelves),

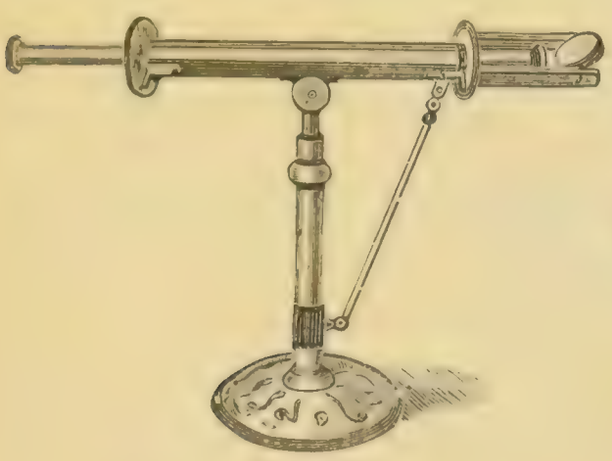
Diameter 2 inches, each	0	0	5
„ 3 „ „	0	0	6
„ 4½ „ „	0	0	8
„ 5½ „ „	0	1	0



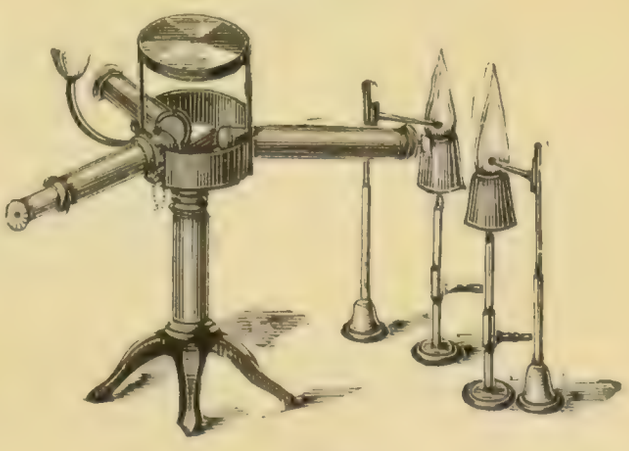
1139

1139 **Polariscope,** with Vertical Tubes and Divided Circle, adapted for Sugar, Chemical Analysis, and general purposes ... £4 10 0

1140 „ Ditto, in Polished Mahogany Case 5 5 0



1141



1142

1141 **Polariscope,** Mitscherlich's, for Sugar Analysis £3 5 0

1963 „ Norremberg's, on Polished Mahogany Stand ... 1 5 0

1142 **Spectroscope,** Kirchoff and Bunsen's, arranged for the examination of two coloured Spectra of Chemicals at one time, with Gas Burner, and 12 Platinum Wires mounted in Glass Handle, with 2 Tables and 5 millimetre scales complete £6 10 0

Polished Case... ... ... extra 1 0 0

1142A ,, Half Shadow Instrument, Jelett-Corny, complete with fittings in Polished Mahogany Case, with one Tube—

200	400	600 m.m.
£24	£28	£33

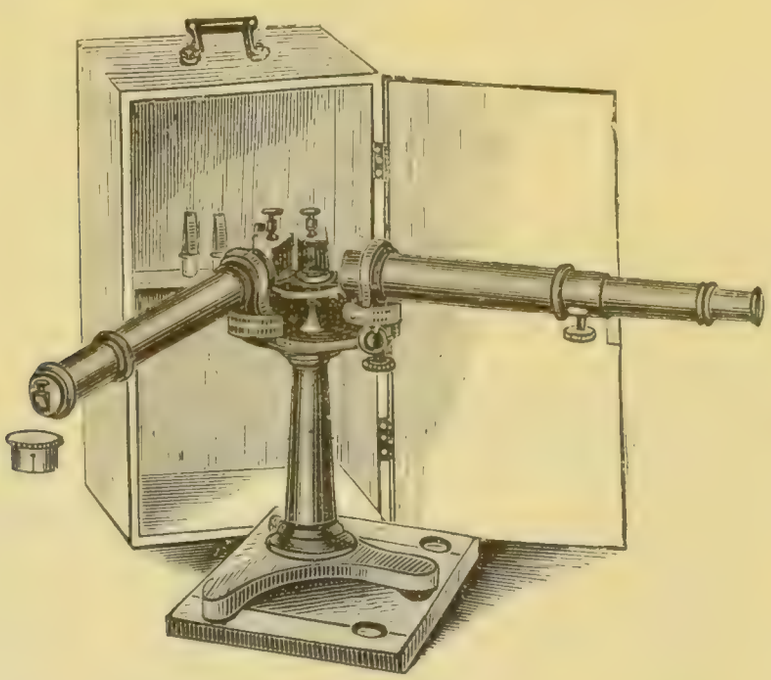
1142B ,, Same as above, but with Double Quartz Wedge Compensator—

200	400	600 m.m.
£40	£44	£48

Extra Apparatus for use with the above instruments—

Glass Tubes, with Brass Caps, 200, 400 or 600 m.m.	each	£0 12	6
Brass ,, ,, ,, ,,	,,	0 13	6
Petroleum Lamp		1 15	0
Triplex Gas Lamp		2 10	0
German Silver Capsule, with counterpoise		0 15	0
1 Normal Weight, 26·048 grammes		0 4	0
1 ,, ,, 13·024 ,, ...		0 3	6

Brix's Saccharometer, 1 set of 3. (*See Page* 144) ... 0 18 0



1989

1989 **Spectroscope,** Chemical, Single Prism, 1 in., with Dividing Circle and Adjusting Slit, in Polished Mahogany Case £5 0 0

1990 ,, Do., $1\frac{1}{4}$ in. Prism, extra Dense Glass, with Dividing Circle, Adjusting Slit and Reflecting Prism, in Polished Mahogany Case ... 6 10 0

1991 **Spectroscope,** with 2 Prisms and 2 Eye Pieces £13 0 0

1992 „ with 2 1¼ in. Prisms, with Racked Telescope and 3 Eye Pieces 17 10 0

1143 **Duboscq Soleil Saccharometer** 12 10 0

1144 **Laurent's Polariscope and Saccharometer,** with 2 Divisions for Sodium Flame, complete with 2 Burners and Double Tubes 18 10 0

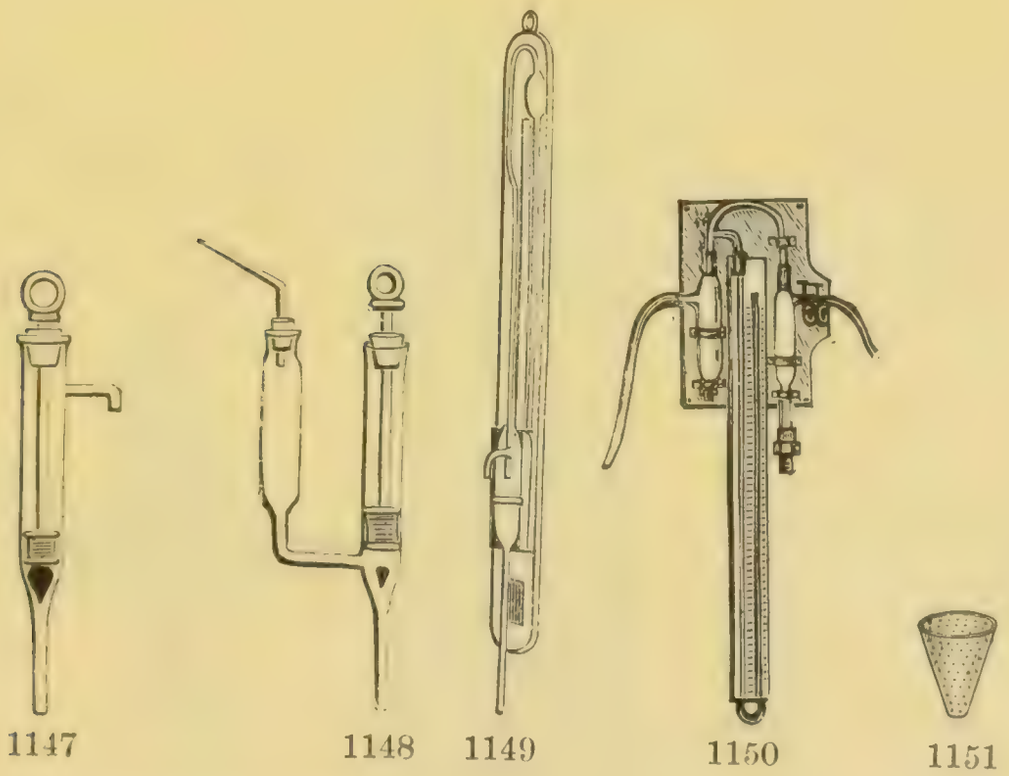
1144A **Spectroscope, Pocket,** with fixed Slit, in Leather Case ... 1 2 6

1144B „ with Adjustable Slit 1 15 0

1144C „ Rainband 2 15 0

1144D „ Grace's 3 3 0

Precipitating Glasses (*See Beakers, Phillips', and Test Glasses*).



1147 1148 1149 1150 1151

1147 **Pumps,** Model, Glass Lift Pump £0 2 9

1148 „ „ „ Force Pump 0 3 0

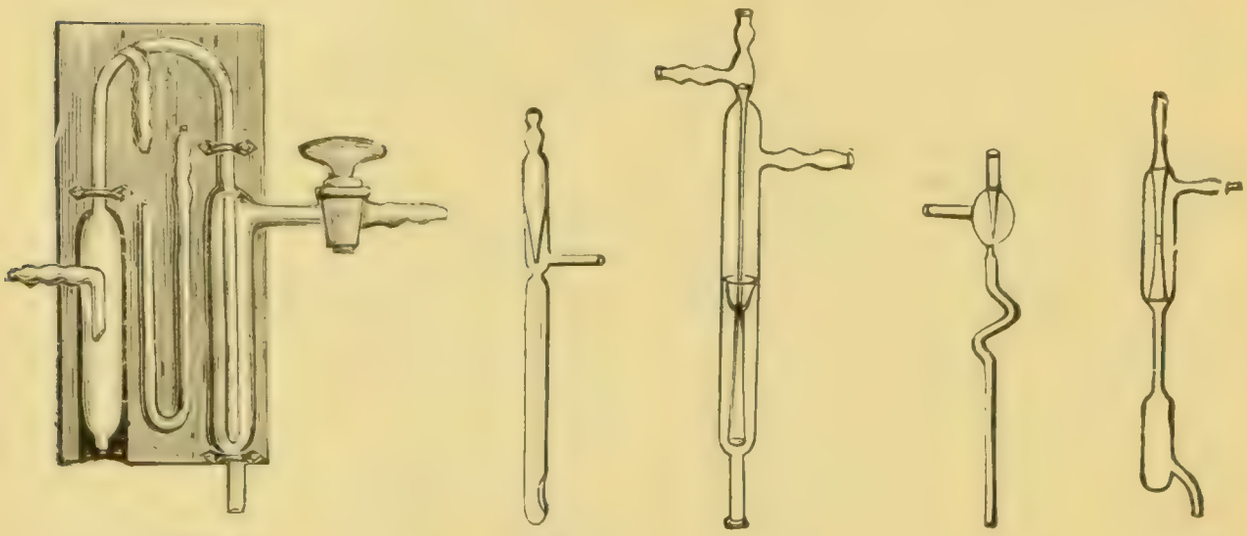
(*See also Pneumatic Apparatus.*)

1149 „ Bunsen's, on Polished Wood Frame, for quick filtering 0 10 0

1150 „ „ on Frame, fitted with Gauge and Strong Clamps 1 10 0

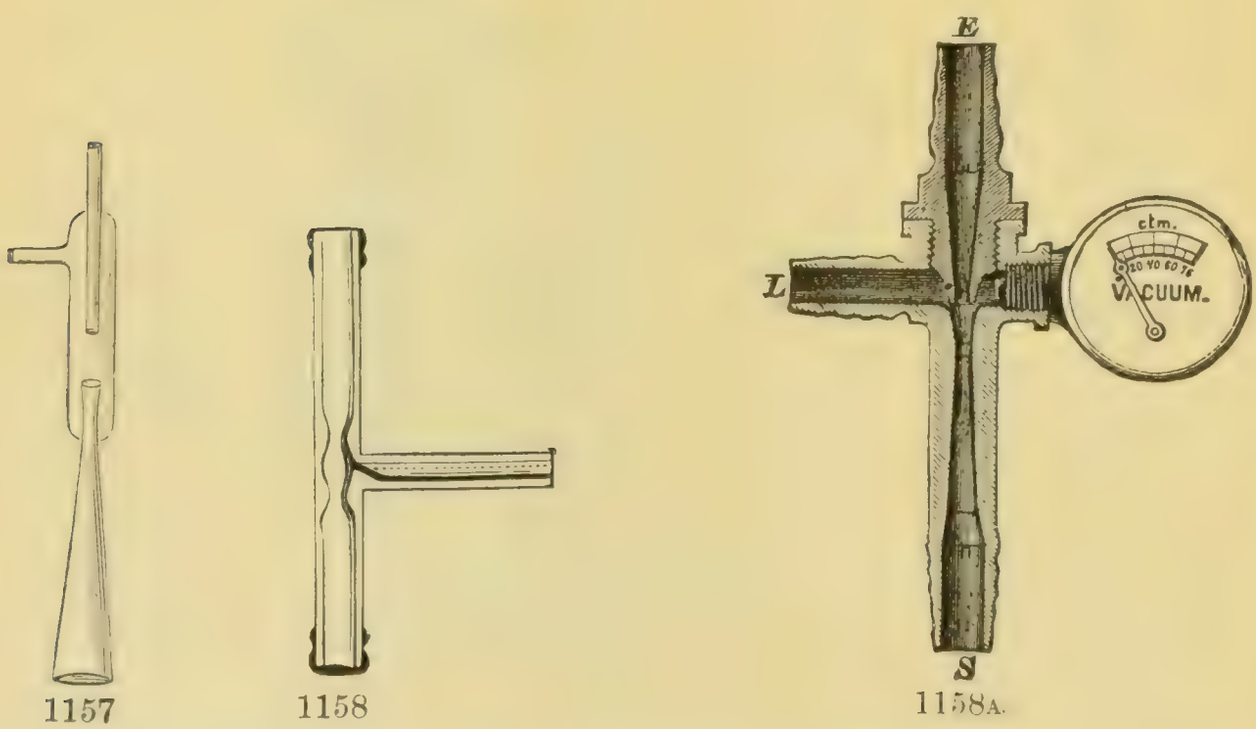
1151 **Platinum Cones,** Perforated ... ... each about 0 6 0

1151A **Porcelain Cones,** Perforated, 1¾ in. diameter ... each 0 0 6



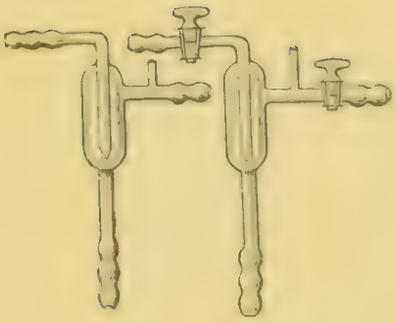
1152 1153 1154 1155 1156

1152	**Pump, Bunsen's Filter,** on Polished Frame					£0	9	0
1152A	,, ,, ,, ,,				with 2 Stopcocks	0	13	0
1153	,, **Filter Tube,** Water					0	1	6
1154	,, ,, ,, Improved					0	3	6
1155	,, ,, ,, Geissler's					0	1	6
1156	,, ,, ,, as used at the University College, London					0	2	3

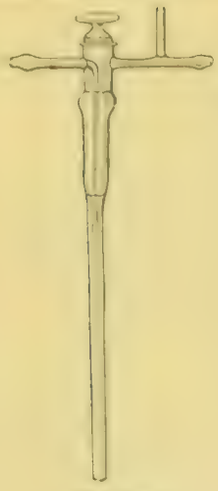


1157 1158 1158A.

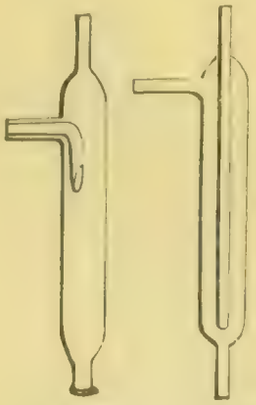
1157	**Pump, Filter Tube,** Finkener's					£0	3	0
1158	,, ,, ,, Tower's					0	3	0
1158A	,, ,, ,, Korting's, Brass, without Gauge ...					0	17	0
1158B	,, ,, ,, Gauge for do.					0	15	0



1158C 1158D



1158E

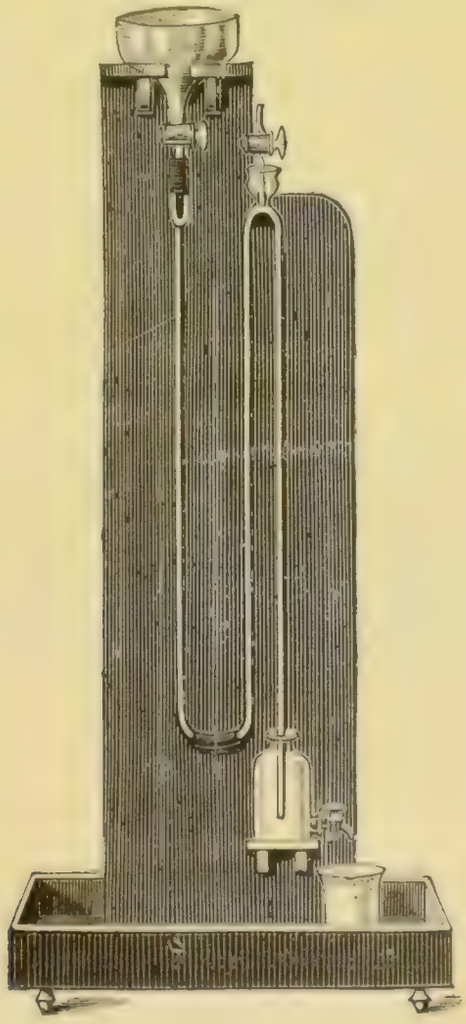


1158F 1158G



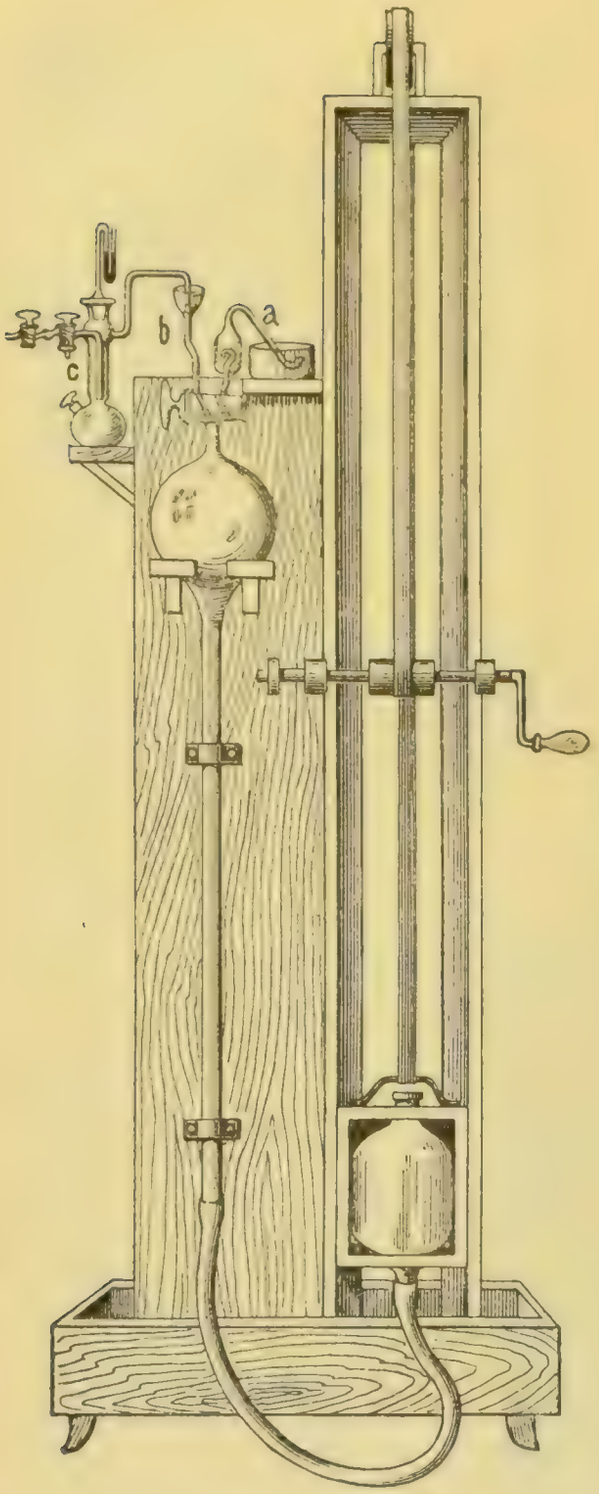
1158H

1158C	**Pump, Filter Tube,** Fischer's	£0	3 0
1158D	,, ,, ,, ,, with two Stopcocks ...	0	7 6
1158E	,, ,, ,, New Pattern	0	5 6
1158F	,, ,, ,, Bunsen's	0	2 0
1158G	,, ,, ,, ,, ...	0	2 0
1158H	,, ,, ,, ,, Syphon form	0	1 6
	,, ,, ,, ,, Set of three	0	4 6



1159

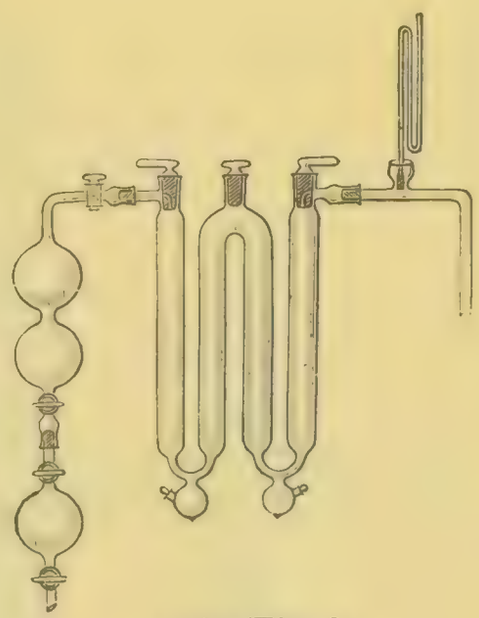
1159	**Sprengel's Pump,** Mounted on Wood Stand, with one-fall Tube	£3	0 0
	,, ,, with three-fall Tube	4	0 0



1159B



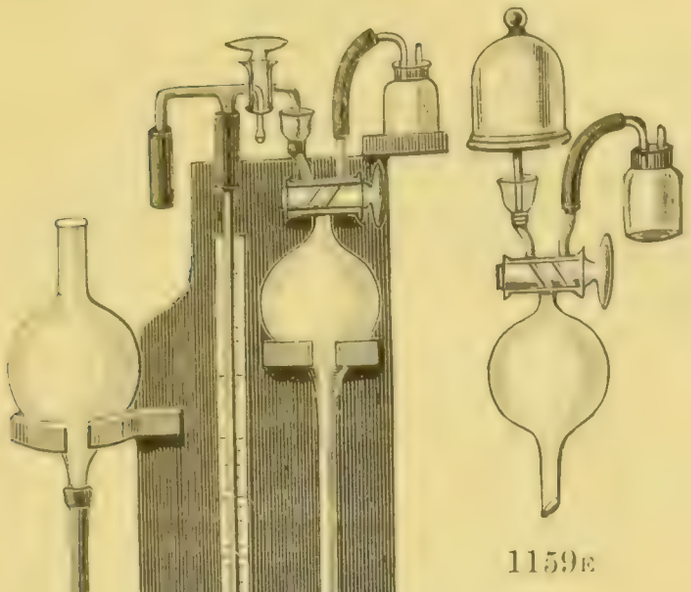
1159C (Fig. 1)



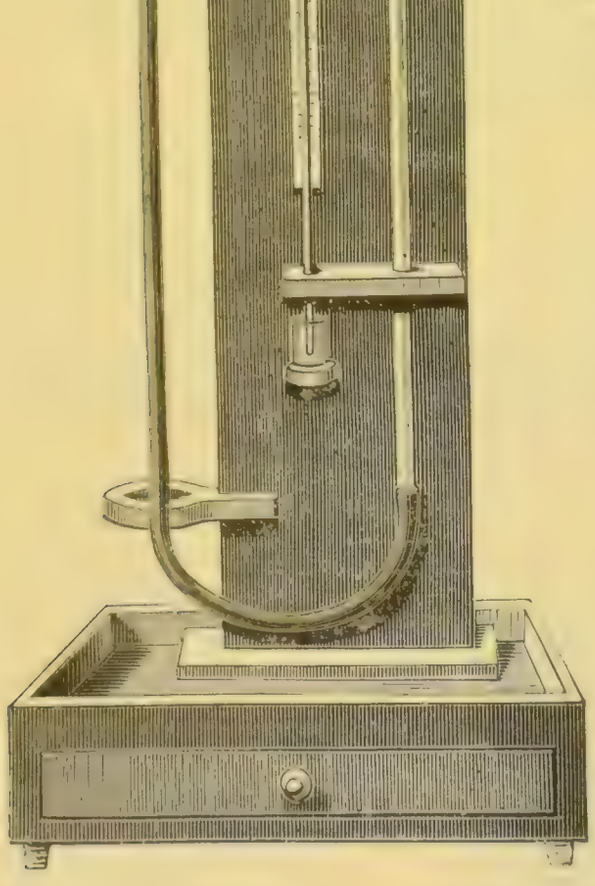
1159C (Fig. 2)

1159B **Sprengel's Pump,** Capacity of Bulb 500 c.c., Mounted on Polished Wooden Stand, complete, with arrangement for raising or lowering Bulb £13 0 0

1159C „ „ with arrangement for Blood Analysis after Pflüger, Fig. 1, or Kronecker, Fig. 2 ... 17 10 0



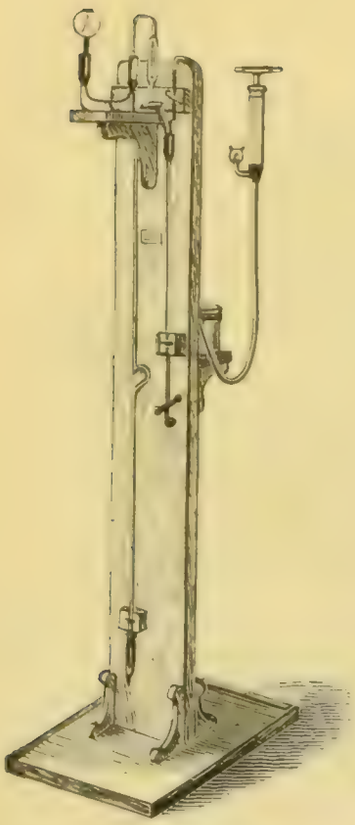
1159E



1159D

1159D **Sprengel's Pump,** improved form, capacity of Mercury Bulb 250 c.c., with long Manometer Tube and Rubber connections, mounted on Stand £5 10 0

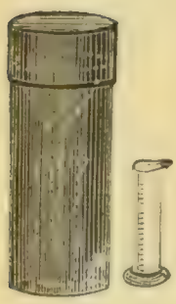
1159E Same as above, capacity of Bulb 350 c.c., with Drying Apparatus 8 10 0



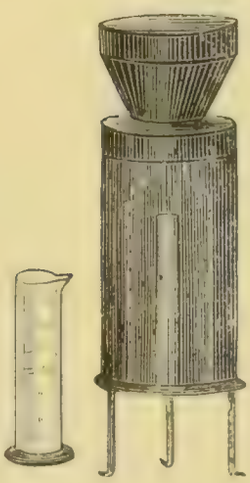
1159F

The advantages of this Pump may be briefly enumerated as follows:—The mercury on passing the exhaust tube forms into plugs or pistons about 1 in. long, and when the vacuum is complete, effectively preventing any of the air passing back. The mechanical exhaust attached will support a mercury column 28 in., and is connected with the reservoir to be exhausted, and also allows the mercury reservoir to be placed about 26 in. below the pump head, where it can be easily replenished. It is obvious, the mechanical exhaust supporting 27 or 28 in. of mercury, the mercurial pump has only the residual air to exhaust. The flow of mercury is regulated by a clamp, by which the vacuum can be left any time or stopped at any stage. The end of fall tube dips into a self-contained cup, preventing the suspended column rising when the vacuum is left.

1159F **Mercury Pump,** Holden and Cossor's improved form (Townson & Mercer, sole agents). Complete, on Stand £3 10 0



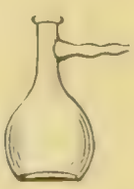
1160



1161



1161B



1162

1160 **Rain Gauge,** Japanned Tin, 5 in. diam., with moveable Top and Graduated Measure £0 6 6

1161 **Rain Gauge,** Symons's, Japanned Tin, with Graduated Measure and Bottle for Receiver... ... ... £0 7 6

1161A Do. do. Copper 0 11 6

1161B Do. Howard's, Copper Funnel, 5 in. diam., with Polished Brass Rim, Glass Bottle, and Graduated Measure divided into $\frac{1}{100}$ths in... 0 9 0

1162 **Flask,** with Side Tube, 24 oz. capacity, strong, for use with Filter Pumps 0 1 6

RETORTS.



1164



1165

1168

1164, 1165 **Retorts,** Fire Clay (Fig. 1164)—

Capacity,	½	pint	Plain, 1/;	Tubulated and Stoppered	(Fig. 1165)		£0	1 3
,,	1	,,	1/6	,,	,,	,,	0	2 0
,,	1½	,,	2/6	,,	,,	,,	0	3 0
,,	2	,,	3/	,,	,,	,,	0	3 6
,,	3	,,	3/9	,,	,,	,,	0	4 3
,,	4	,,	4/6	,,	,,	,,	0	5 0
,,	8	,,	6/	,,	,,	,,	0	6 6

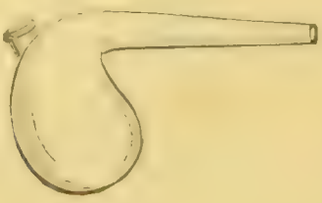
1166 **Retorts,** Berlin Biscuit Porcelain, Plain—

	Capacity	2	6	8 oz.
	Plain ...	2/6	4/	5/
1167 ,,	Stoppered	3/6	5/	6/

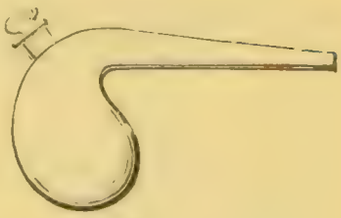
1168 ,, Berlin Porcelain, with moveable head, 8 oz. capacity each 0 5 6



1169



1170



1171

Retorts, Best Bohemian Hard Glass, for Distillation—

		2	4	6	8	12	16	20	24 oz. capacity
1169	Plain	3d.	4d.	4½d.	5d.	6d.	7d.	7d	8d. each
		32	40	48	64	80	100	120	160 oz. capacity
	,,	9d.	10d.	1/	1/2	1/2	1/4	1/8	2/ each
		2	4	6	8	12	16	20	24 oz. capacity
1170	Tubulated	4d.	4d.	5d.	6d.	7d.	8d.	8d.	9d. each
		32	40	48	64	80	100	120	160 oz. capacity
	,,	10d.	1/	1/2	1/4	1/6	1/9	2/	2/6 each
		2	4	6	8	12	16	20	24 oz. capacity
1171	Stoppered	5d.	6d.	7d.	8d.	10d.	1/	1/1	1/2 each
		32	40	48	64	80	100	120	160 oz. capacity
	,,	1/3	1/6	1/9	2/	2/6	3/	3/3	3/6 each

1172 **Retorts,** Bohemian Glass, for Manufacturers' use—

Capacity	8	10	14	18	24	30	36	42	48 lbs.
Tubulated as Fig. 1170—	2/3	2/6	3/	4/6	5/6	7/	8/6	10/6	12/6 each
Stoppered as Fig. 1171—	3/3	3/6	4/6	5/	6/6	8/6	10/6	12/6	15/ ,,



1174

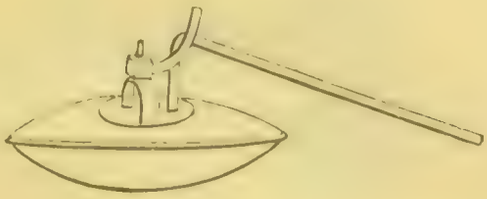
1175

1174, 1175 **Retorts,** Best German Hard Glass—

Capacity	1	2	4	6	8	12	16	24	32	40 oz.
Stoppered, Fig. 1174	4/	4/6	6/	7/6	8/6	—	—	—	—	— per doz.
Plain, Fig. 1175	1/6	2/	2/6	3/	3/6	4/6	5/6	7/6	9/	10/ ,,



1176



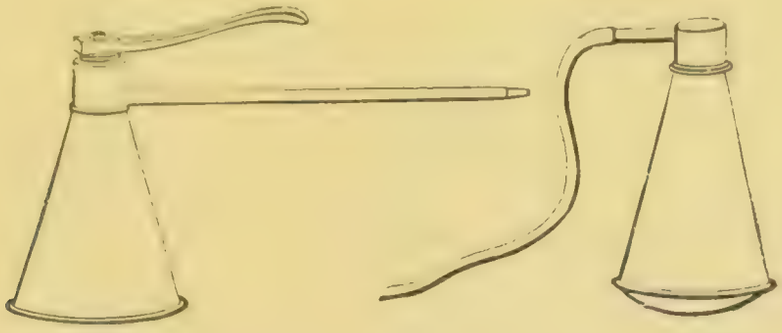
1177

1176 **Retorts,** Brazed Copper, with Tubulure for Destructive Distillation—Capacity 20 oz. £0 9 6

„ 40 „ 0 12 6

1177 „ Sheet Iron, Oxygen, with Leading Tube, for Chlorate of Potash and Manganese 0 4 0

1178 „ Tube, Copper, for making smaller quantities of Oxygen (Fig. 809), fitted with Cork and Glass Leading Tube ... 0 2 6



1179 1181

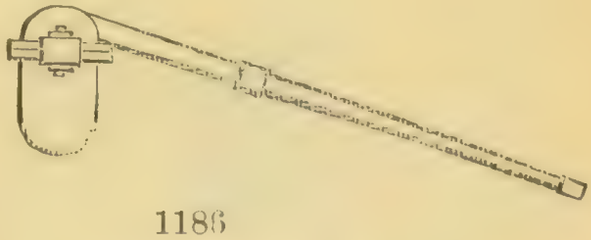
1179 **Retorts,** Sheet Iron, Oxygen, with Leading Tube and Key (Fig. 1179), for Chlorate, Potash, and Manganese, Capacity about 1½ pint £0 7 6

1180 „ „ with Copper Bottom 0 8 6

1181 „ Copper, Polished, with Brass Cap and Union ... 0 12 6



1185



1186

1185 **Retorts,** Cast Iron, for Mercury Distillation, Oxygen, &c., with Ground Flange, Clamp, and Leading Tube—

Capacity about 1 pint £0 12 0

„ 1½ „ 0 18 0

1186 „ Cast Iron, for Mercury, &c., bored with long Leading Tube to Screw, Loose Head fastened by Bolts—

Capacity 1 5 9 pints

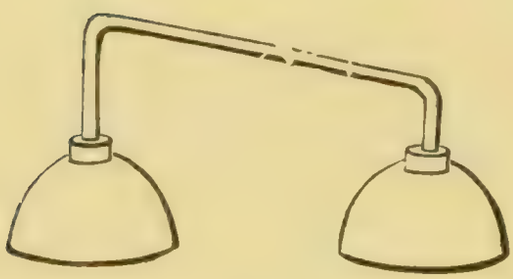
9/ 20/ 32/



1187

1187 **Retorts,** Cast Iron, for Mercury Distillation from Gold Amalgam, with long Leading Tube to Screw, Loose Head fastened by Bolts and Condenser, complete—

Capacity 5 pints	...	...	...	...	£1	15	0
„ 9 „	...	...	...	...	2	12	6

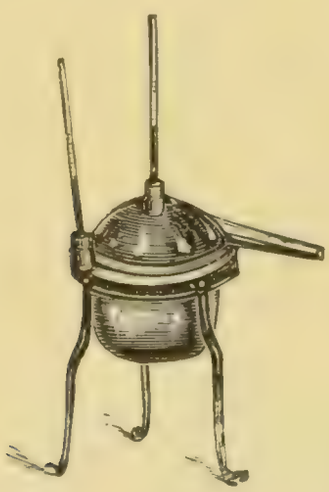


1188

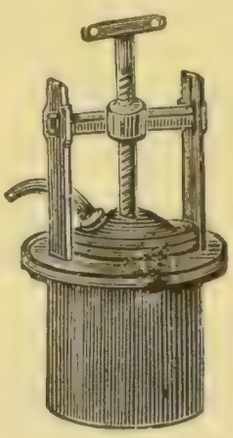


1189

1188	**Retort and Receiver,** Lead, for Hydrofluoric Acid		...		0	10	0
1189	„ Lead, with Tubulure, capacity 20 oz.		...	...	0	7	6
1190	„ Platinum (varies)	...	...	per oz.	2	10	0



1191



1192

1191 **Retort,** with Water Bath, Copper, for Distillation of Volatile Spirits, Naphtha, &c., on Stand, without Thermometer. Capacity about 1 pint 0 15 0

1192 „ Cast Iron, Mercury for Gold Assay 1 2 6



1193 1194 1195 1196 1197

1193 to 1195 **Receivers,** Bohemian Glass, for Retorts—

Plain, Fig. 1193; Tubulated, Fig. 1194; Stoppered, Fig. 1195.

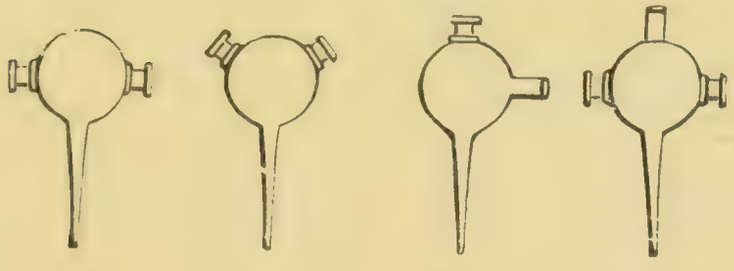
Same Prices as Retorts.

1196 **Receivers,** Bohemian Glass, with two necks—

Capacity	8	12	16	20	32	48 ozs.
	8d.	9d.	10d.	1/	1/3	1/6 each

1197 **Receivers,** Bohemian Glass, with three necks—

Capacity	8	16	20	32	48	64	80 ozs.
	1/2	1/4	1/6	1/8	2/	2/6	2/9 each



1198 1199 1200 1201

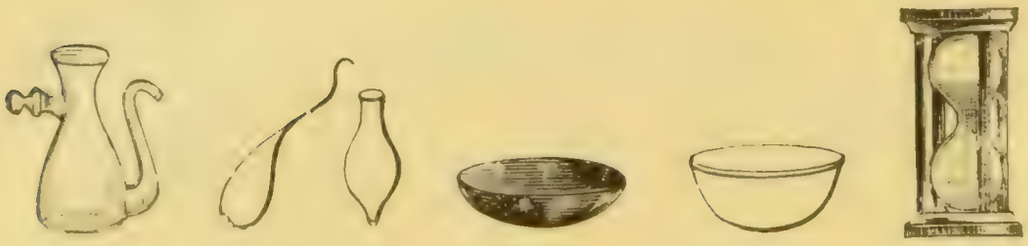
1198, 1199, 1200 **Receivers,** Bohemian Glass, Quill, with two necks, either form same price—

Capacity	8	16	20	32	48	64	80	120 ozs.
	1/4	1/8	1/10	2/	2/6	3/	3/6	4/6 each

1201 **Receivers,** Bohemian Glass, with three necks and Quill—

Capacity	16	20	32	48	80	120	160 ozs.
	2/6	3/	3/6	4/	5/6	6/6	8/ each

Stoppering, 6d. each neck extra.



1202 1203 1204 1205 1207 1209

1202 **Receivers,** Florentine (Separators)—

Capacity	16	24	40	60	80 ozs.
	1/3	1/8	2/	2/6	3/6 each

1203 **Rupert's Drops,** for showing the brittleness of glass, per doz. £0 0 8

1204 **Bologna Vials** ... ... ,, 0 1 4

1205 **Sand Bath Dishes,** Shallow, Tinned Iron—

4	5	6 in. diam.
2d.	3d.	4d. each.
1/9	2/6	3/6 per doz.

1206 ,, ,, Sheet Iron—

8	10	12 in. diam.
5d	7d.	9d. each

1207 ,, ,, Tinned Iron, Deep, diameter 4½ in. each 0 0 6

1208 ,, ,, Copper—

3	4	5	6 in. deep
10d.	1/6	2/	2/9 each

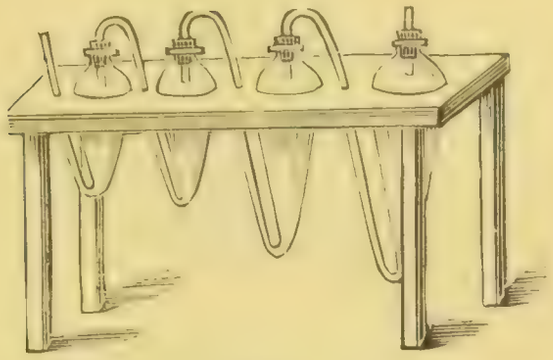
1209 **Sand Time Glasses,** in Polished Wood Frames—

2	3	5	10	15	30	60 minutes
1/	1/	1/6	1/9	2/	2/3	2/6 each

Scales and Weights (*See "Balances and Weights"*).



1210



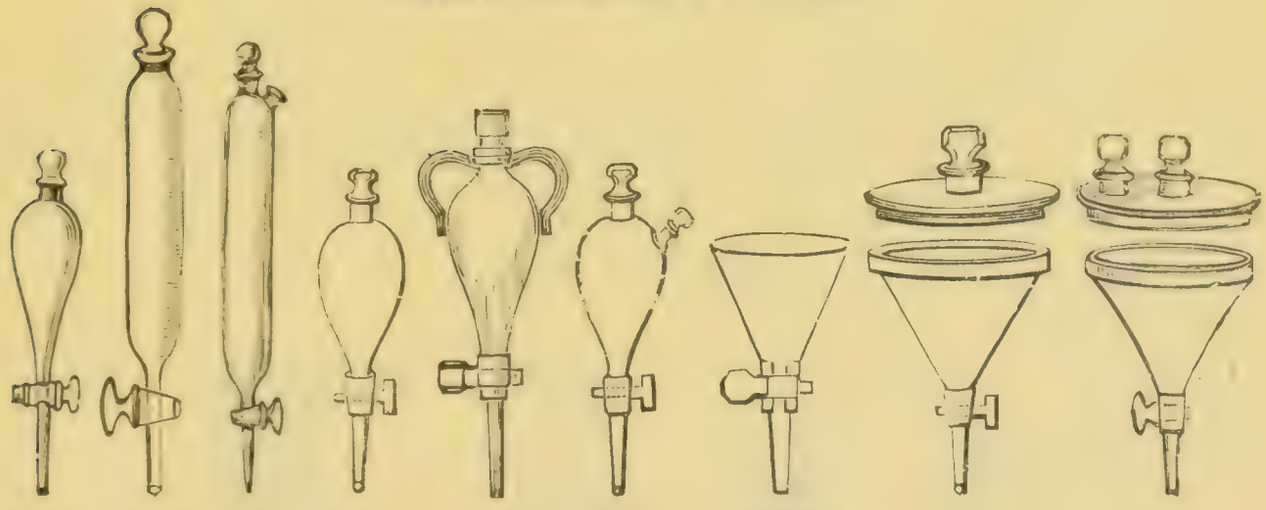
1211

1210 **Schulze's Elutriating Apparatus,** for Analysis of Soils, &c. 0 4 6

1211 **Washing Apparatus,** for Analysis of Soils, set of 4 Vessels 0 10 6
Stand ... ... extra 0 7 6

1211A „ „ with Water Reservoir and Glass Tap, mounted on Stand, complete ... 1 10 0

SEPARATORS.



1212 1213 1214 1215 1216 1217 1218 1219 1220

1212 **Separators,** Pear Shape, German—

5	10	20	40	60 ozs. capacity
3/3	3/6	4/6	5/6	6/ each

1213 „ Cylindrical, with Stopper and Stopcock—

5	10	20	30	40 ozs. capacity
2/6	3/	3/6	4/	4/6 each

1214 „ Cylindrical, with Stopper and Stopcock, and extra neck—

5	10	20	30	40 ozs. capacity
2/8	3/2	3/8	4/2	4/8 each

1215 **Separators**, Bohemian Glass, Bulb Form, with Stopper and Stopcock—

Capacity about...	10	20	30	40 ozs.
Diam. of Bulb ...	3¼	3⅝	4½	5¼ in.
	7/	7/6	8/	8/6 each

1216 „ Bohemian Glass, with Stopper, 2 Arms and Stopcock—

Capacity ...	10	20	30	40 ozs.
Diam. of Bulb ...	3¼	3⅝	4½	5¼ in.
	8/	8/6	9/	10/ each

1217 „ Bohemian Glass, Bulb Form, with Tubulure at side and top, Stoppered and Stopcock—

Capacity about	10	ounces, diameter of Bulb	3¼	in.	£0 8 6
„	20	„ „	3⅝	„	0 9 0
„	30	„ „	4½	„	0 9 6
„	40	„ „	5¼	„	0 10 6

1218 „ Funnels, Bohemian Glass, with Stopcock and Ground Edge—

1¼	4¾	5¼	6¼	7¼	8¼	9½ in. diam.
4/6	5/	5/9	6/6	7/6	9/	11/ each

1219 „ Bohemian Funnels, with Glass Cover Stoppered. Stopcock and Groove in Funnel, diam. of

Funnel	4¾	in.	£0 7 0
„	5⅛	„	0 8 0

1220 „ Cover with 2 Stoppers 4¾ „ 0 9 0

„ „ 5¼ „ 0 10 6

SIEVES.



1221



1222



1223



1224

1221 **Sieves**, Brass Wire, with Wooden Frame—

Diameter 6	6	6	6	6 in.
Mesh No. 20	30	60	80	90
2/	2/	2/4	2/9	3/ each

1222 „ Brass Wire, Japanned Tin Frame—

Diameter	3	4	6	9 in.
Mesh No. 30	1/	1/1	1/5	2/6 each
No. 60	1/1	1/4	1/9	3/6 „
No. 90	1/3	1/8	2/	4/3 „

1223 **Sieves,** Brass Wire, with Japanned Tin Frame, Cover and Bottom—

Diam.	3	4	6	9 in.
Mesh No. 30	1/10	2/2	3/	4/6 each
No. 60	2	2/6	3/3	5/ each
No. 90	2/6	3/	3/9	6/ each

1224 ,, Brass Wire, Japanned Tin Frames, with Cover and Bottom, in sets of three, Meshes No. 30, 60 and 90—

Diam.	3	4	6	9 in.
	4/6	5/	7/6	12/ per set

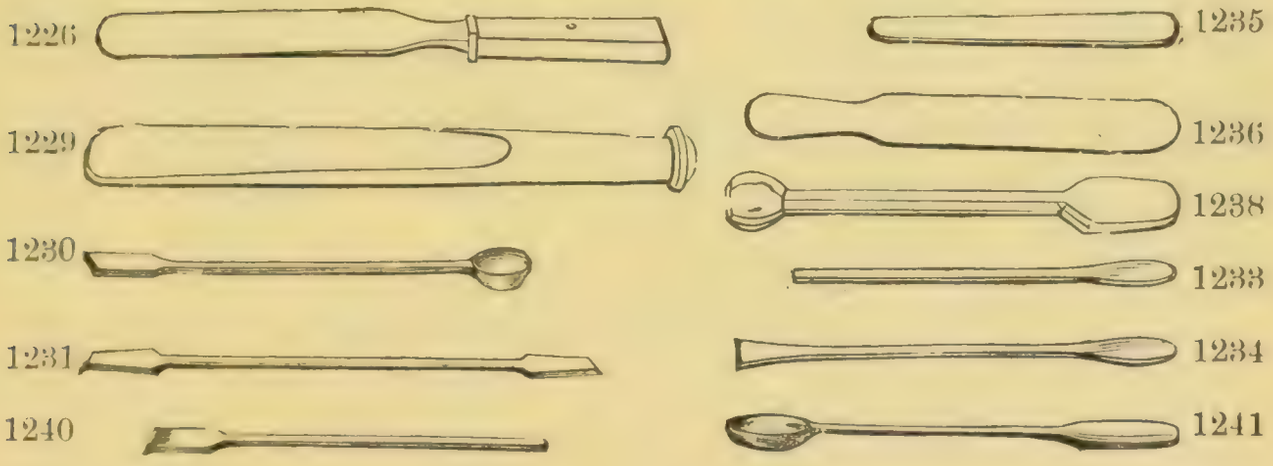
Other sizes and Meshes of every description made to order.



1225

1225 **Sharpeners for Cork Borers,** Brass, with strong Steel Knife £0 2 6

SPATULAS.



1226 **Spatulas, or Palate Knives,** Steel Blade, in Cocus Wood Handle—

Length of Blade	3	4	5	6	7	8	9	10	12 in.
	7d.	8d.	9d.	10d.	1/	1/6	1/9	2/6	3/6 each

1227 ,, Steel, Nickel Plated, to prevent rust—

3	4	5	6	7 in.
1/1	1/3	1/5	1/7	1/9 each

1228 ,, Steel, Artist's thin

4	5 in.
1/	1/3 each

1229 ,, German Porcelain—

Length	5	6¼	7¼	9	12	13½ in.
	6d.	10d.	1/	1/3	1/6	2/ each

1230 **Spatulas,** Thuringian Porcelain, with Spoon at one end—

$4\frac{3}{4}$	$5\frac{3}{4}$	$8\frac{1}{4}$	$11\frac{1}{2}$	$14\frac{1}{4}$	17 in.
7d.	8d.	1/	1/4	1/9	2/6 each

1231 ,, German Porcelain, double Spatula—

5	$7\frac{1}{4}$	9	$11\frac{1}{2}$	$13\frac{1}{2}$ in.
7d.	8d.	1/	1/6	2/ each

1233 ,, Dresden Porcelain— Length $5\frac{1}{2}$ $8\frac{1}{2}$ in.

4d. 6d. each

1234 ,, ,, Flat End— Length $8\frac{1}{2}$ 13 in.

8d. 1/4 each

1235 ,, Platinum— Length 2 to 6 in. (varies), about 50/ per oz.

1236 ,, Bone—

3	4	5	6	8	10 in.
2d.	3d.	4d.	6d.	9d.	1/ each

1237 ,, Ebonite—

Length 3	4	5	6	7	8	9	10 in.
2d.	2d.	3d.	3d.	4d.	5d.	6d.	8d. each

1237A ,, Horn, Polished—

5	$6\frac{1}{2}$	8	10 in.
5d.	6d.	9d.	1/3 each

1238 ,, Bohemian Glass, strong. Length $7\frac{1}{2}$ in.... ... £0 0 8

1239 ,, Cut and Polished ,, $7\frac{1}{2}$,, ... 0 1 0

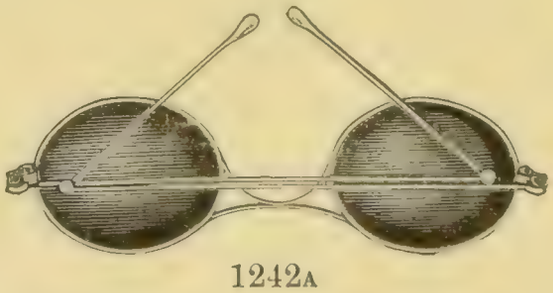
1240 ,, German Glass, slighter ,, 7 ,, ... 0 0 6

1241 ,, Nickel, Polished, with Spoon at end. Length 6 in.... 0 1 6

,, $4\frac{3}{4}$,, ... 0 1 0



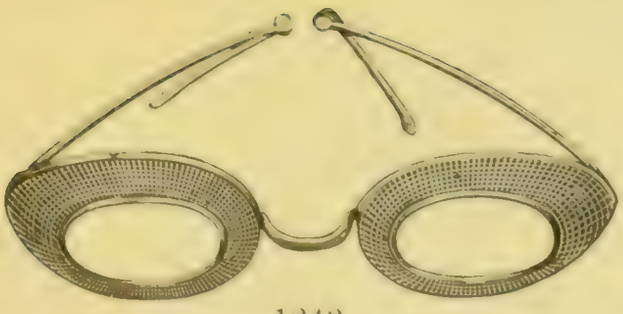
1242



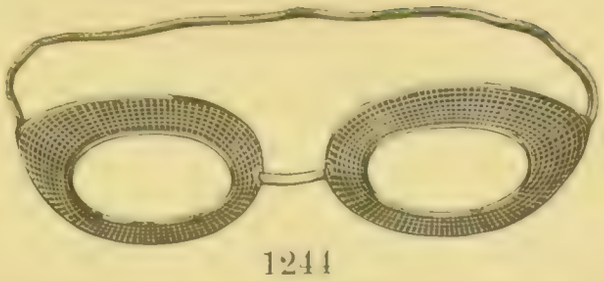
1242A

1242 **Spectacles,** Smoked or Blue Glass, for Protection to the Eyes in Furnace Operation, Steel Frames 1/9, 2/6 and £0 3 6

1242A ,, Blue or Smoked Glass, Globular, for Copper Assayers 0 1 0



1243



1244

1243 **Wire Gauze Protectors,** with White Glass, Steel Frames, in Leather Case... ... £0 2 0

1244 „ „ with Blue or White Glass, Elastic Band 0 0 6

„ „ „ „ „ Velvet Bound 0 0 8

SPECIFIC GRAVITY BOTTLES.

(For taking the accurate Specific Gravity of Liquids to be used with Chemical Balance.)



1245 1247 1250 1252 1254 1255 1256A

1245 **Specific Gravity Bottle,** with Drilled Stopper—

	Capacity	10	20	25	50	100 grammes
		1/6	1/9	2/	2/9	3/ each
1246	„	Capacity	100	250	500	1000 grains
		1/6	2/		2/6	3/ each
1247	„	with Brass Counterpoise, in Japanned Tin Case—				
	Capacity	...	25	50	100 grammes	
			3/9	4/3	5/ each	
1248	„	Capacity	...	250	500	1000 grains
				3/9	4/3	5/ each

1249 „ with Brass Counterpoise, in Japanned Tin Case, for Beer Estimation—Capacity 1000 grains, adjusted to $\frac{1}{50}$th grain ... £0 15 0

1250 „ with Thermometer Stopper, Scale inside—

Capacity 25 grammes 0 4 6

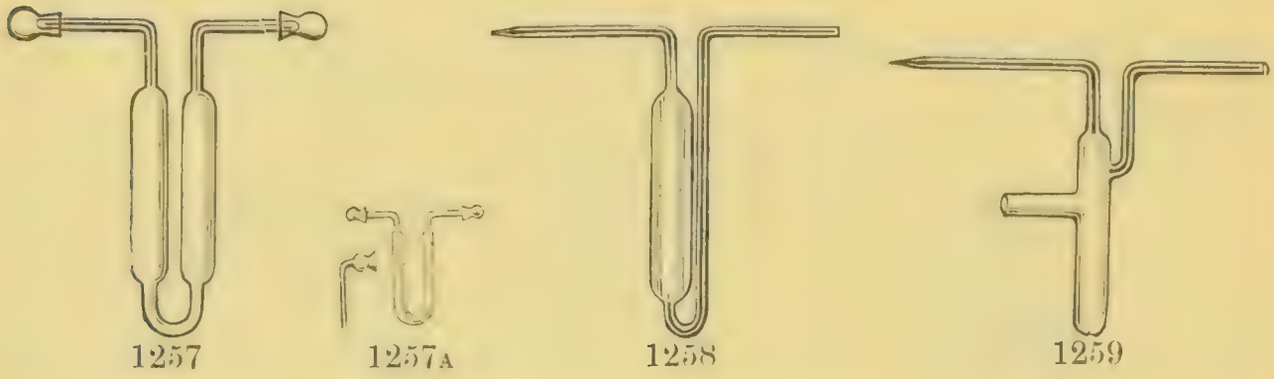
„ 50 „ 0 5 0

1251 „ „ 500 grains 0 5 0

„ 1000 „ 0 5 6

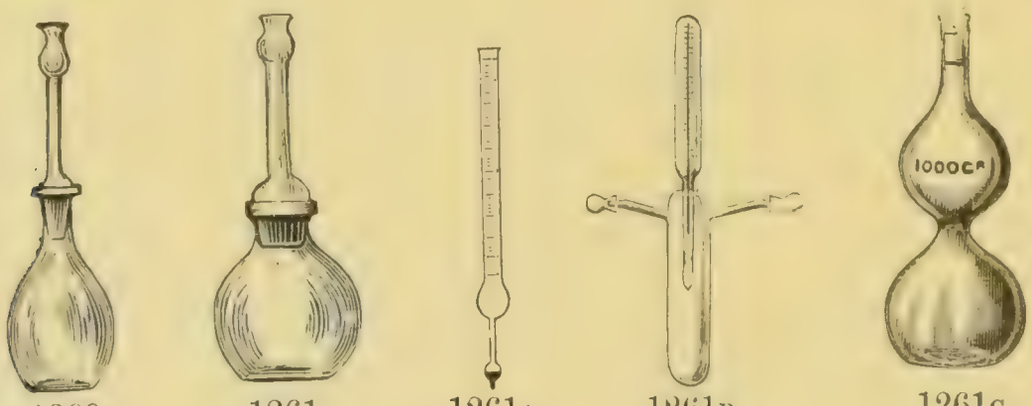
o 2

1252	**Specific Gravity Bottle,** with Thermometer Scale outside—Capacity 50 grammes	£0	6	0
1253	,, ,, 500 or 1000 grains ...	0	6	0
1254	,, with Thermometer Stopper outside, and side Tube with mark—Capacity about 25 or 50 grammes	0	7	6
1255	,, Regnauld's, with Stopper and mark in neck—Capacity 25 or 50 grammes, each	0	2	0
	,, 500 or 1000 grains ,,	0	2	0
1256A	,, with Thermometer Stopper and side Tube, accurately marked at 500 grammes, as recommended in Wanklyn's "Gas Engineer's Chemical Manual" ...	0	10	6



1257 1257A 1258 1259

1257	**Sprengel's Specific Gravity Tube,** for Oils, capacity 30 c.c.	£0	1	9
1257A	,, ,, ,, ,, ,, about 10 c.c....	0	1	9
1258	**Nicols' Specific Gravity Tube**	0	1	0
1259	**Korper's** ,, ,, ,, ...	0	1	3



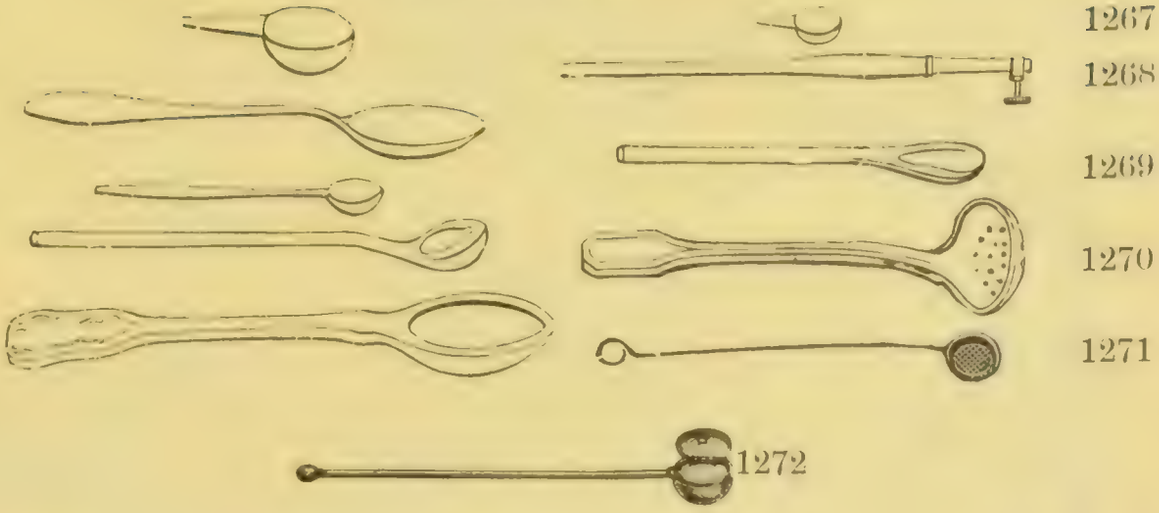
1260 1261 1261A 1261B 1261C

1260 **Flask** for Specific Weight of Liquids—

	10	25	50	100 grammes
	9d.	10d.	1/	1/3 each
1261 ,, for Solids, W.M.—	10d.	11d.	1/1	1/4 ,,

1261A	,, Fulton's, for Specific Gravity of Minerals, Cylinder graduated from 0 to 100	£0	2	0
1261B	,, Reischauer's, graduated in $\frac{1}{5}$ths, with Thermometer enclosed	0	10	6
1261C	,, Keates', for Cement	0	3	6

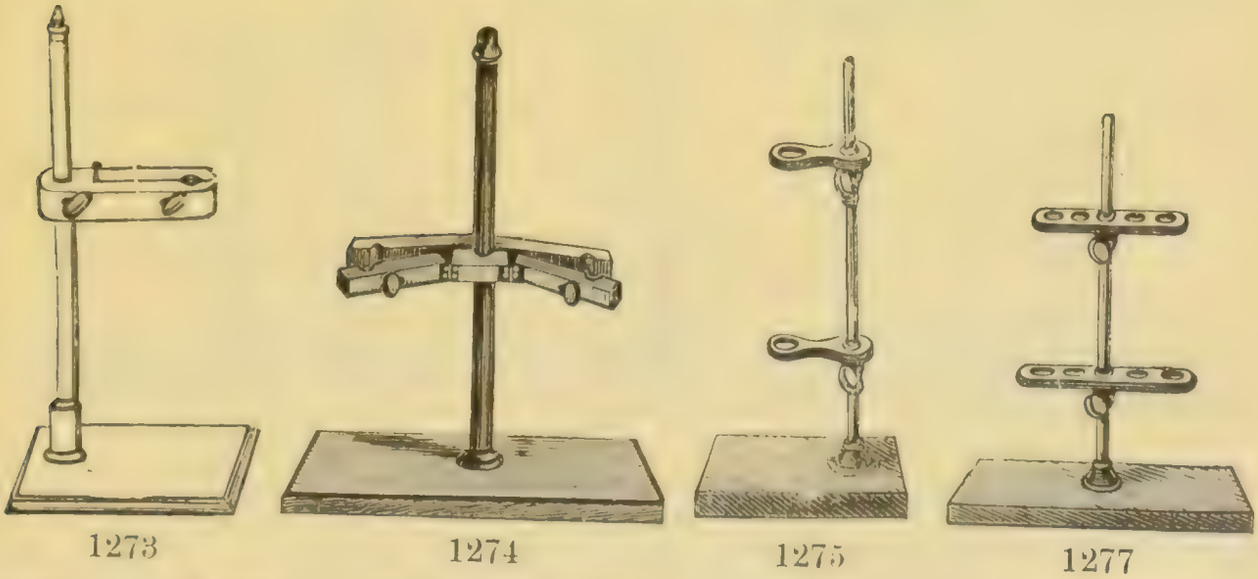
SPOONS.



1262	**Spoon,**	Iron Blowpipe Test Spoon	£0	0	2
1263	,,	Iron	0	0	3
1264	,,	German Silver Test Spoon	0	0	9
1265	,,	Glass... ... small, 4d.; medium, 8d.; large	0	1	0
1266	,,	White Stoneware—Tea, Dessert, and Table Spoon, each 4d., 6d., and	0	0	8
1267	,,	Platinum Blowpipe ...each about 2/6, 3/6, and	0	4	6
1268	,,	Holder, Wood Handle, with Brass End and Screw for fixing	0	1	0
1269	,,	Porcelain, Stirrer form ... each 6d. and	0	1	0
1270	,,	,, pierced for Crystals	0	2	0
1271	,,	Wire Gauze, for Sodium and Potassium	0	1	0
1272	,,	,, ,, ,, with Cover ...	0	2	0
1272A	,,	Horn—Tea, Dessert, and Table Spoon, each 7d., 11d. and	0	1	3

STANDS OR SUPPORTS.

For Burettes, Retorts, Flasks, Tubes, &c.

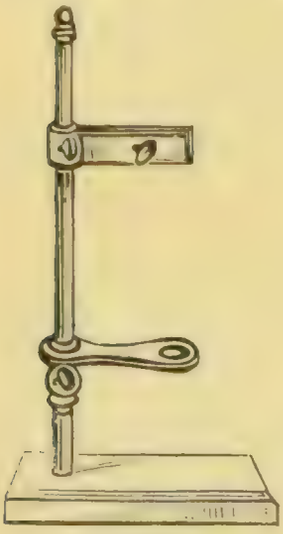


1273 1274 1275 1277

1273 **Stand** (Clamp), Polished Mahogany, fitted with Cork and Boxwood Screws, for Mohr's Burettes, Tubes, &c.

					Single, each	£0	4 6
1274	,,	,,	,,	,,	Double ,,	0	6 6

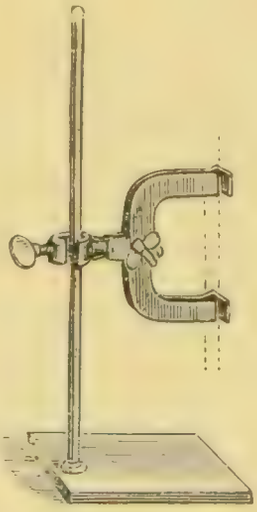
1274A	**Stand,** Polished Black Wood, Single...	£0	3	10
1274B	,, ,, ,, Double	0	5	3
1274C	,, White Wood, not polished, Single	0	3	0
1274D	,, ,, ,, Double	0	3	6
1275	,, Teak, Mohr's Burettes, for 1	0	2	0
1276	,, ,, ,, 2	0	2	6
1277	,, ,, ,, 4	0	3	6



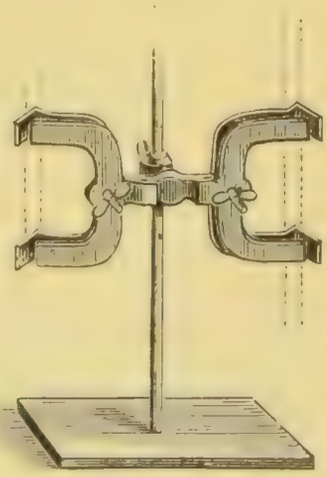
1278



1279

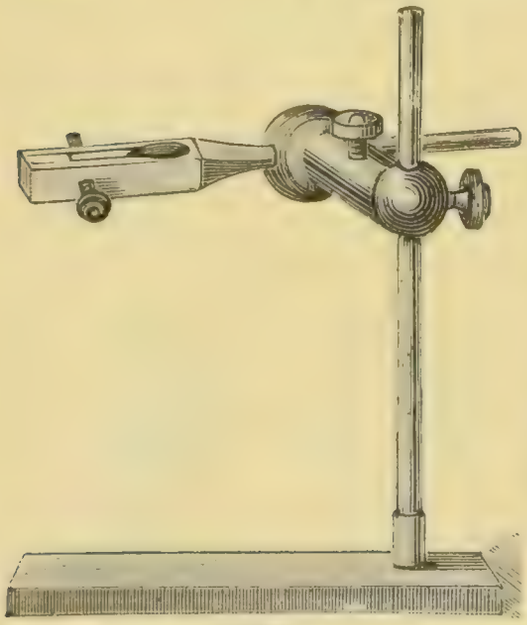


1280A

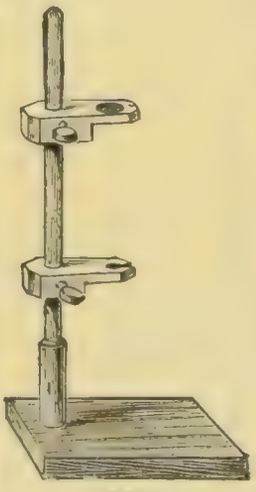


1280B

1278	**Stand,** Mahogany, with Clamp and Support for Mohr's Burettes	£0	5	0
1279	,, Mahogany, for Geissler's Burettes	0	4	0
1280	,, White Wood ,, ,, ...	0	2	9
1280A	,, for 1 Burette, Brass Clamp, on Iron Foot ...	0	5	0
1280B	,, 2 ,, ,, ,, ...	0	7	0



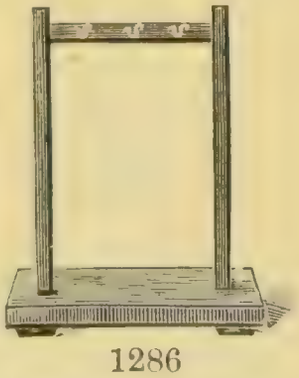
1282



1283A

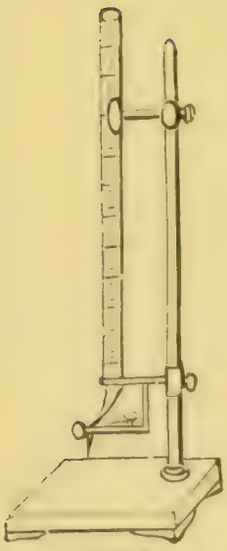


1284

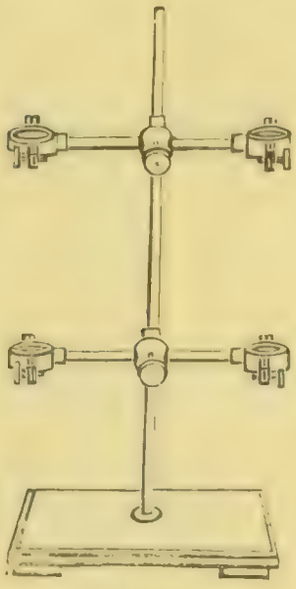


1286

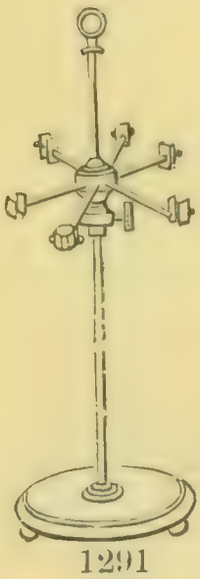
1282	**Stand,** Universal, for Retorts, Flasks, &c., end fitted with Cork, Polished Wood	£0	7	6
1283A	,, for Burettes, White Wood, cheap form	0	1	6
1284	,, Vertical, Teak, fixed, height 11 in.	0	1	9
1285	,, ,, Polished Mahogany...	0	2	3
1286	,, Polished Black Wood, with 3 hooks for U Tubes, &c. Height 12 in., width 13 in., each	0	3	0
	,, 15 in., ,, 12 in., ,,	0	3	6



1287



1290



1291

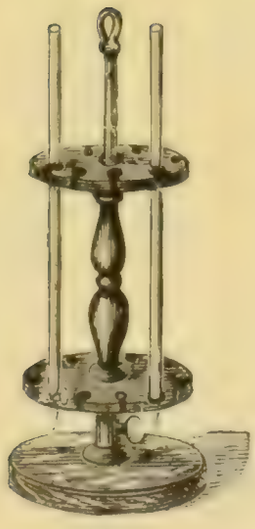
1287 **Stand for Burette,** with Clip, Dr. Percy's form, Brass Rod, and Polished Wood Foot ... £0 7 6

1288 „ „ Iron Foot and Rod, Brass Mount, for 1 0 4 0

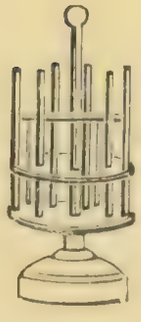
1289 „ „ „ „ „ 2 0 5 6

1290 „ „ Square Iron Foot, Brass Rod, Polished, best finished, with Adjusting Screws, for 2 Burettes 0 14 0

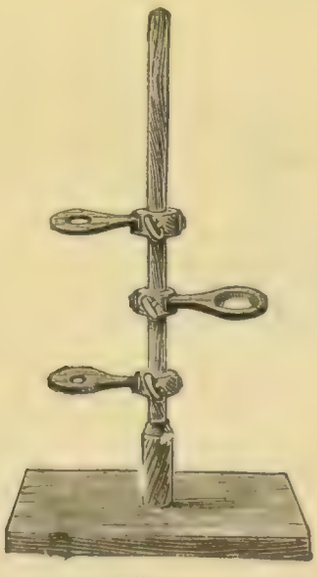
1291 „ „ Mounted on Round Porcelain Foot, for 6 Burettes, with Polished Brass Rod and Gun Metal Mounts, fittings arranged so that the Burettes can be readily removed, for refilling, &c., without unscrewing 1 10 0



1292



1293



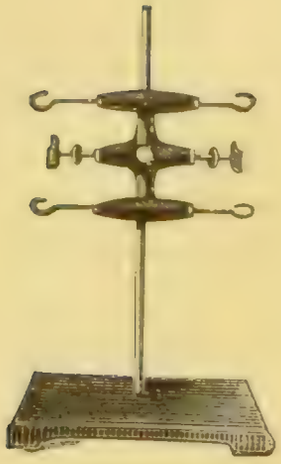
1294A

1292 **Stand,** Mahogany, for 8 Burettes, with Moveable Round Stage, on Solid Marble Foot £0 13 0

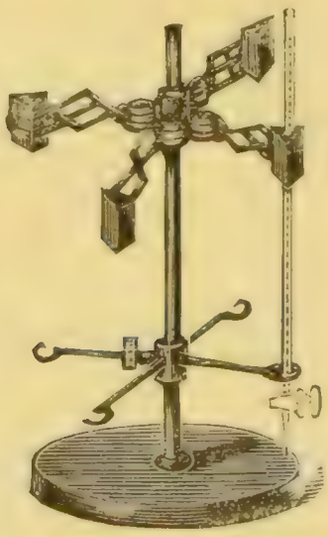
1293 „ Black Wood, with Moveable Round Stage for 12 Pipettes, in Polished Black Wood 0 6 0

1294 „ Polished Mahogany ditto 0 7 6

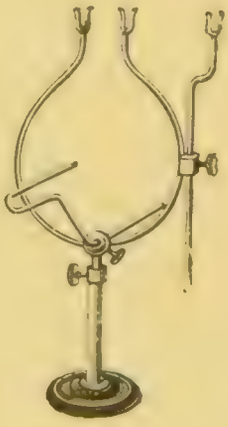
1294A „ Teak, for Burette and Funnel 0 2 6



1298



1299

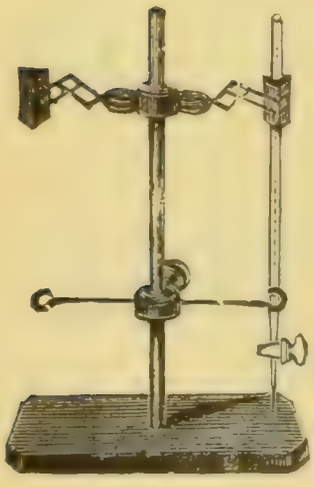


1301

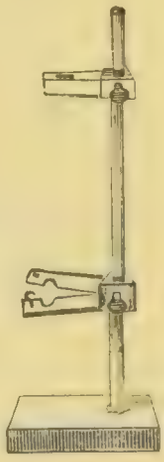
1298 **Stand,** Universal, for 2 Burettes (Kaehler's), on Iron Foot ... £0 7 6

1299 „ „ with Spring Clips, for 4 Burettes, Iron Foot 0 12 6

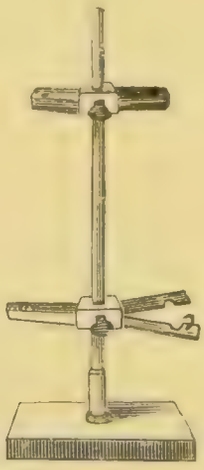
1301 „ Brass, on Iron Foot, with Sliding Rod and Support for Potash Bulbs, &c. 0 4 6



1302



1303



1304



1304A

1302 **Stand,** Universal (Riedel's), with Spring Clips, for 2 Burettes £0 8 0

1303 „ Teak, with Clip and Support, for Mohr's Burette, with Stopcock 0 3 3

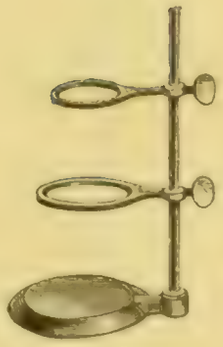
1304 „ Ditto for 2 Burettes 0 3 9

1304A „ **Mahogany (Vaughan's),** for 4 Burettes of either form, with or without Stopcock, adjustable to any height. The centre is a revolving Brass Rod, coloured Black and White for reading off any colour of solution in Burette ... 0 11 6

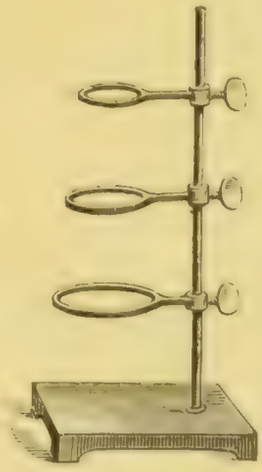
IRON STANDS FOR RETORTS, FLASKS, &c.



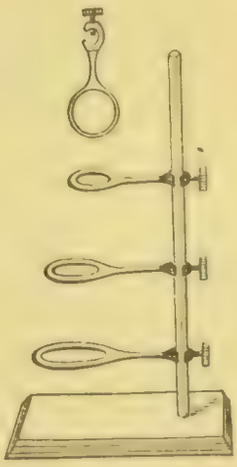
1305



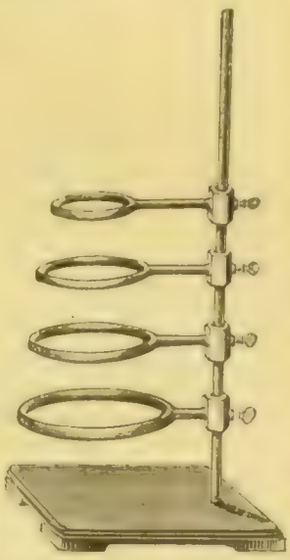
1307A



1308A



1309

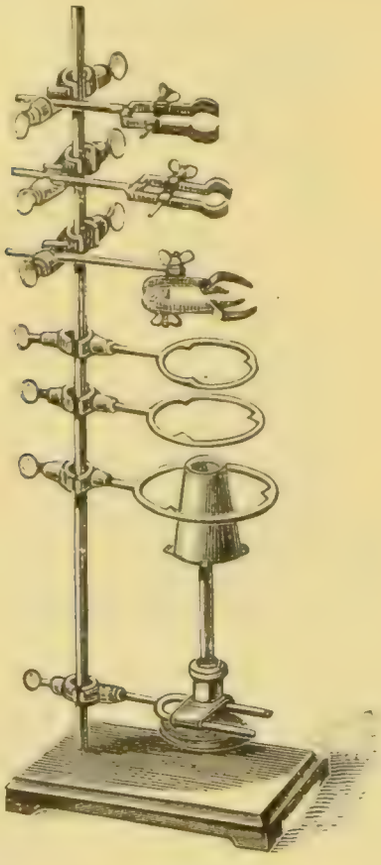


1320A

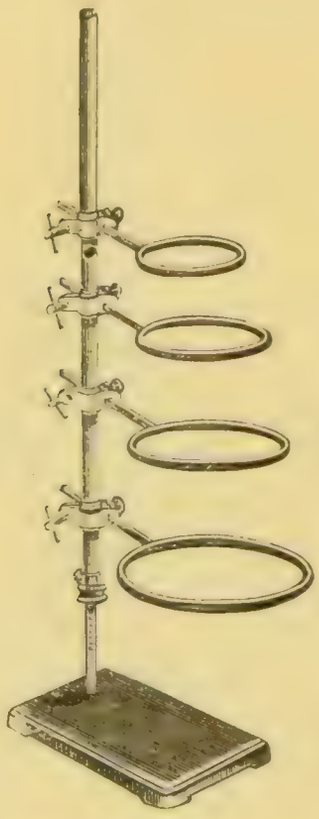
1305	**Retort Stand,**		Iron Rod and Foot, with 1 Iron Ring, length of Rod 10 in., diam. of Ring $2\frac{1}{4}$ in. ...	£0	1	0
1307A	,,	,,	2 Malleable Iron Rings 2 in. and 3 in. diam., length of Rod 12 in., on round base ...	0	1	3
1308A	,,	,,	3 Malleable Iron Rings $1\frac{3}{4}$, $2\frac{1}{8}$, $2\frac{3}{4}$ in. diam., length of Rod 15 in., on square base ...	0	1	9
1309	,,	,,	3 Adjustable Bright Brass Rings, length of Rod 15 in., diam. of largest Ring 3 in ...	0	2	6
1310	,,	,,	3 Adjustable Bright Brass Rings, length of Rod 17 in., diam. of largest Ring $3\frac{1}{4}$ in. ...	0	3	0
1310A	,,	,,	Same as above, with 3 Malleable Iron Rings...	0	2	6
1311	,,	,,	3 Adjustable Bright Brass Rings, length of Rod 20 in., diam. of largest Ring $4\frac{1}{4}$ in. ...	0	4	6
1311A	,,	,,	Same as above, with 3 Malleable Iron Rings...	0	4	0
1312	,,	,,	4 Adjustable Bright Brass Rings, length of Rod 24 in., diam. of largest Ring 6 in. ...	0	8	6
1315	,,	,,	Galvanised Iron, Strong, with 3 Adjustable Galvanised Iron Rings, Brass Sockets, length of Rod 24 in., diam. of largest Ring 5 in. ...	0	12	6
1316	,,	,,	Galvanised Iron, 4 Adjustable Rings, length of Rod 30 in., diam. of largest Ring 6 in. ...	0	17	6
1317	,,	,,	Iron, 2 Adjustable Brass Rings, Bronzed, length of Rod 24 in., diam. of largest Ring 5 in.	0	5	6
1318	,,	,,	with Brass Bronzed Clamp	0	8	6
1320A	,,	,,	with 4 Massive Iron Rings $3\frac{1}{4}$, $3\frac{3}{4}$, $5\frac{1}{2}$, $6\frac{1}{2}$ in. diam., with Triangular Sockets, will fit any Rod, length of Rod 26 in., base $9\frac{1}{2} \times 6$ in.	0	9	0



1319



1319A



1320B

1319 **Clamp,** with right and left screw, for Light Tubes, mounted on Brass Rod, and Tripod Foot £0 6 0

1319A **Retort Stand,** Universal, with 3 strong Malleable Iron Rings 3, 4, 5¼ in. diam., 2 strong right and left screw Brass Clamps, 1 strong Iron Retort Clamp, Bunsen Burner, Blowpipe Jet and Chimney, complete 1 5 0

1319B ,, ,, only with 3 Rings, as above 0 7 0

1320B **Ellis's Patent Telescopic Retort Stands—**

These Retort Stands possess the advantage of enabling an operator without assistance to adjust the position of a series of connected apparatus with the greatest ease, without the inconvenience and loss of time occasioned by the necessity (where ordinary Stands are used) of adjusting each ring, clamp, or other support separately, which operation is not only tedious, but involves either the loosening of the connections or the risk of damaging the apparatus.

In the better qualities of these Stands both the Rod and Tube are made of a Special Copper Alloy, which not only possesses much greater strength than ordinary brass but its durability and non-corrosive properties are much superior to that metal.

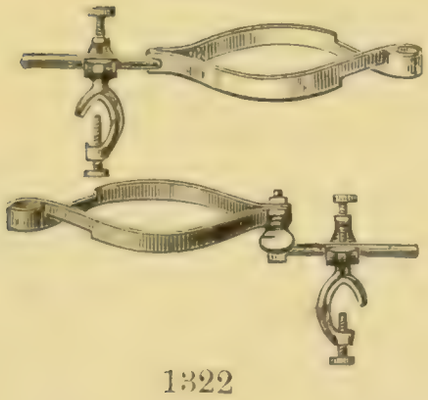
Sizes of Retort Stands—

No. 1 & 1A,	mean height	15 in.,	telescoping from	12 in. to 18 in.
,, 2 & 2A	,,	20 in.	,,	16 in. to 24 in.
,, 3 & 3A	,,	25 in.	,,	20 in. to 30 in.
,, 4 & 4A	,,	30 in.	,,	24 in. to 36 in.

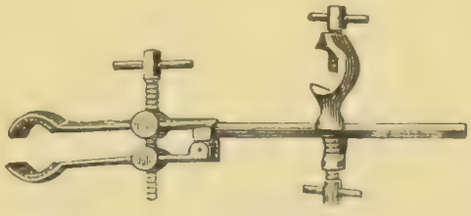
RETORT STANDS—

No. 1	Iron Rod and Tube, Brass Collar, with 3 Malleable Iron Rings, largest 3½ in.	£0	3	6
1A	—Brass Cased Iron Rod and Collar, Special Metal or Steel Tube, 3 Brass Blocks, and 3 Interchangeable Iron Rings, largest 3½ in.	0	6	0
2	—Iron Rod and Tube, Brass Collar, with 3 Malleable Iron Rings, largest 4 in.	0	4	6
2A	—Brass Cased Iron Rod, Special Metal or Steel Tube, 3 Brass Blocks, and 3 Interchangeable Rings for same, largest 4 in.	0	7	6
3	—Brass Cased Iron Rod, Special Metal or Steel Tube, 3 Brass Blocks, and 4 Interchangeable Malleable Iron Rings, largest 5½ in.	0	13	0
3A	—Special Metal Rod and Tube, 3 Brass Blocks, and 4 Strong Interchangeable Brass Rings, largest 5½ in.	0	16	0
4	—Brass Cased Iron Rod, Special Metal or Steel Tube, 4 Brass Blocks, and 6 Interchangeable Malleable Iron Rings, largest 6¼ in.	0	18	6
4A	—Special Metal Rod and Tube, 4 Brass Blocks, and 6 Strong Interchangeable Brass Rings, largest 6¼ in.	1	4	0

1321

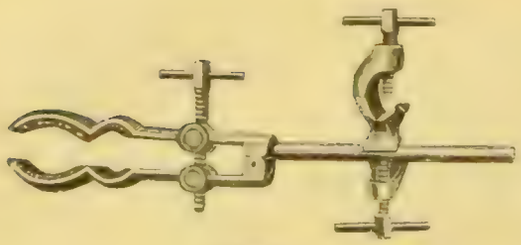


1322

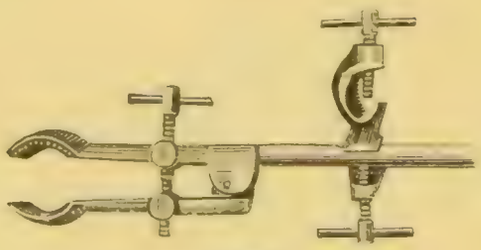


1323

1321	**Clamp,** Brass, with Interchangeable Block to fit small Retort Stands for Test Tubes, &c.	£0	1	6
1322	,, ,, with Moveable Joint	0	2	0
1323	,, ,, with right and left screw and Interchangeable Malleable Iron Block, to fit any size Rod, ends lined with cork ... Small	0	2	9
1324	,, ,, ,, ,, Medium	0	3	6
1325	,, ,, ,, ,, Large	0	3	9



1325A



1326



1328



1330



1331

1325A **Clamp,** Bright Brass, with Double Vice, right and left screw, and Interchangeable Brass Block ... each £0 4 6

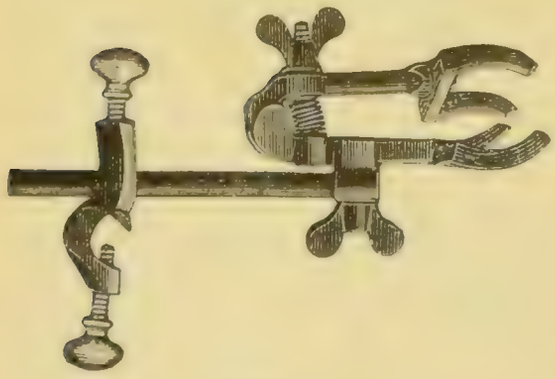
1326 ,, very strong, Bright Brass, with right and left screw, for Retorts, &c., ends lined with cork 0 5 0

1327 ,, Ditto, Gun Metal, best finished 0 7 6

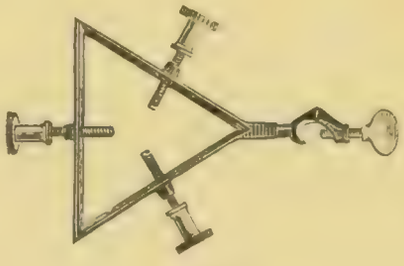
1328 **Iron Block,** with Slot or Collar for holding Rods, in either horizontal or perpendicular position ... 0 1 6

1330 ,, with 2 Screws 0 1 0

1331 **Clamp,** Bronzed Iron, fitted with Spring, for horizontal or perpendicular position 0 4 0



1331A



1331B

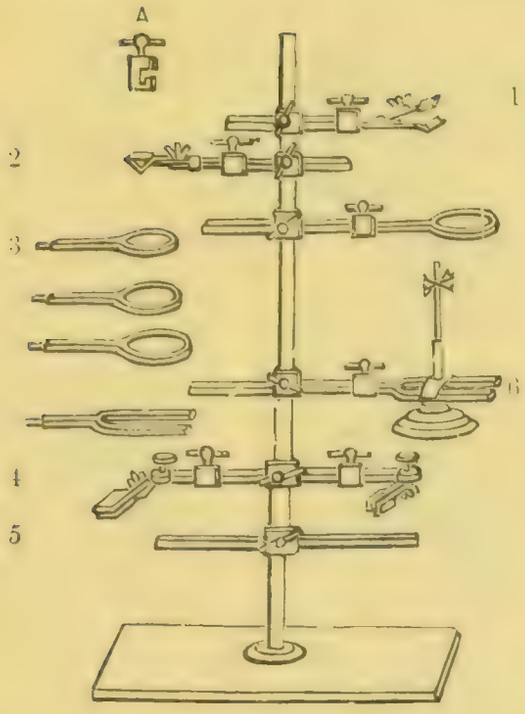


1331C

1331A **Clamp,** strong, Iron, for Retorts and Condensers ... £0 6 0

1331B **Crucible Support,** Brass, with 3 Adjusting Screws ... 0 2 6

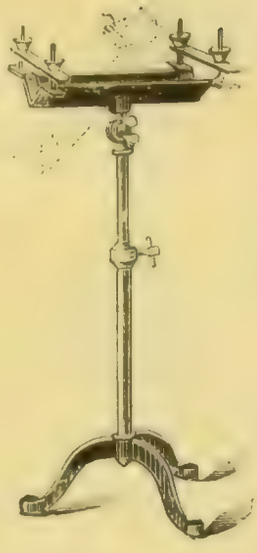
1331C **Clamp,** with Screw to fit on Burettes ... each 0 1 6



1332



1333

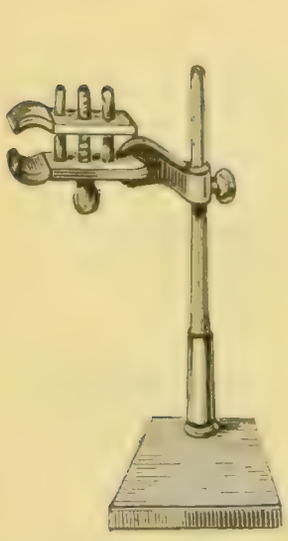


1334

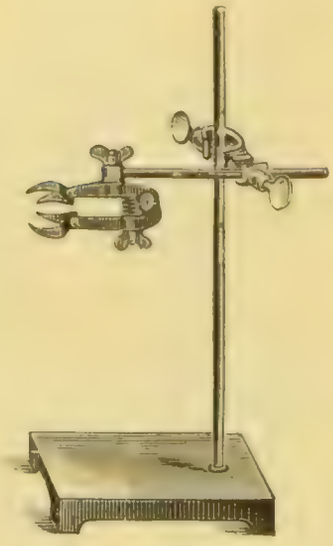
1332 **Universal Laboratory Stand,** for light work, consisting of a Brass Rod $\frac{3}{8}$ in. square, 28 in. high, on Cast Iron Base, 12 in. × 6 in. Fig. A represents a section of the Block with Screw in which either of the Rods fit and can be readily removed from the Stand, if necessary, without disturbing the other parts; (1) Clamp and Rod for Burettes or Tubes; (2) Clamp and Rod, larger, for Burettes, Flasks, or small Retorts; (3) Block Clamp and 3 Rings, diam. $2\frac{1}{2}$, 3, and $4\frac{1}{2}$ in.; (4) Double Clamp, with Universal Movement, for Burettes or Tubes; (5) Rod and Clamp; (6) Fork and Bunsen's Burner, with Star, Support and Chimney, Rod and Clamp. The Set complete ... £2 10 0

1333 **Stand for Glass Liebig's Condenser,** with upright Mahogany Slide Support, Brass Clamp, on Iron Tripod Foot 0 8 0

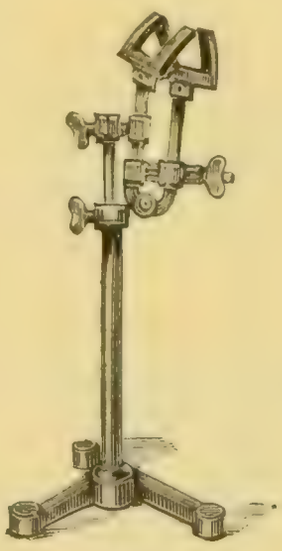
1334 **Stand for Glass Liebig's Condenser,** Brass Bronzed Support, Moveable Joint, on Iron Tripod Foot ... 0 12 0



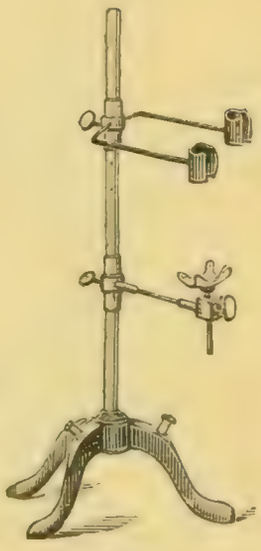
1335



1335A



1337



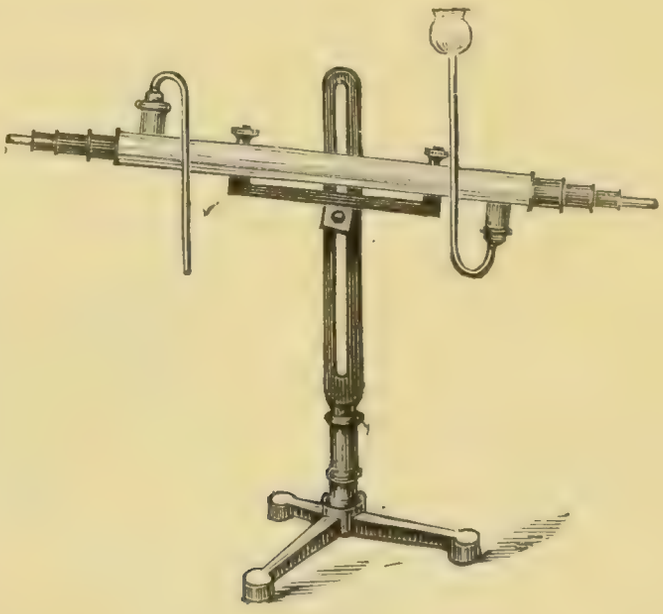
1337A

1335 **Stand,** Mahogany, for Glass Liebig's Condenser, Retorts, &c. £0 8 6

1335A ,, Iron, with strong Clamp for Condensers 0 7 6

1337 ,, Brass, with Sliding Rod and Iron Clamp, Universal ... 0 8 6

1337A ,, Townson's Universal, for Hofmann's Tubes, Brass Rod and Fittings 0 8 0

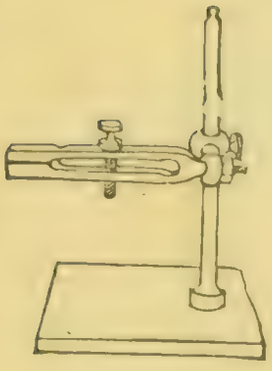


1338

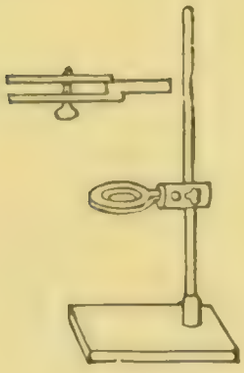
1338 **Stand,** Iron, with Brass Bronzed Support, for Glass Liebig's Condenser, as Fig. 1334, with Mahogany Slide, on Iron Tripod Foot £0 10 6

1339 **Brass Bronzed Support** only, with Boss to fit large Retort Stand 0 7 0

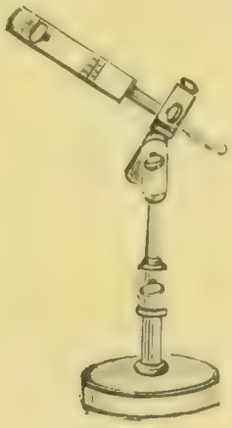
WOOD STANDS AND SUPPORTS FOR FLASKS, TUBES, &c.



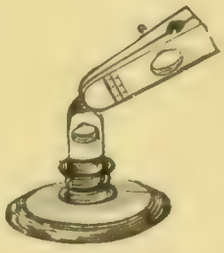
1340



1344



1345

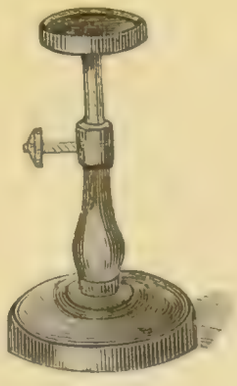


1346

1340	**Stand,** Turned White Wood, with Clamp for Retorts, Tubes, and Flasks	£0	2	6
1341	,, with extra joint	0	3	6
	Clamps, only to slide on Rod ... 1/6 and	0	2	6
1342	,, Mahogany, Polished, as Fig. 1340	0	4	6
1343	,, ,, with extra joint	0	5	6
1344	,, with Clamp and Funnel Holder, Mahogany ...	0	5	0
1345	,, Universal Holder (Bunsen's), Mahogany, with Sliding Rod and Loaded Foot	0	5	6
1346	,, on Foot, Universal Joint (Shark)	0	3	0

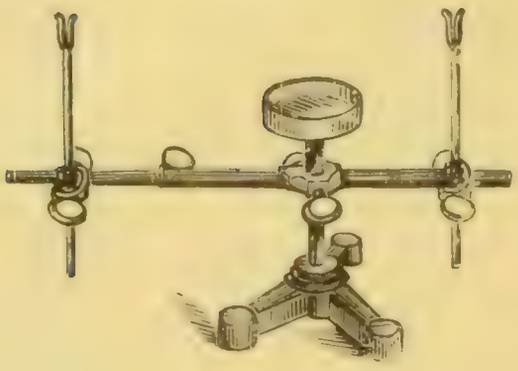


1349

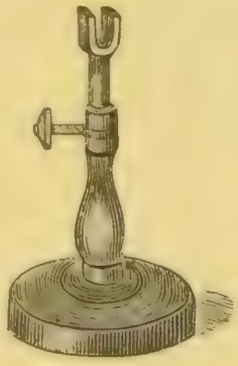


1350

1349	**Stand,** for Raising Apparatus (Rising Tables), Polished White Wood, diam. of Table 4 in. and 6 in., each 2/6 and	£0	3	0
1350	,, ,, ,, with rim at the edge of the Table Top, 4 in. diam.	0	3	6



1351



1353

1351 **Stands,** Iron, on Tripod Rising Table of Wood, with Iron Rod, Rod and Hook Supports, with Clamp for Tubes ... £0 15 0

1353 **Crook Support,** with 2 Brass Crooks 0 1 8

1354 „ „ Mahogany, with Sliding Support Rod 14 in. × $\frac{5}{8}$ in. 0 2 0



1355



1356



1357



1358



1358A

1355, 1356 **Hook Support,** to fit Rising Table, Fig. 1349, for Tubes, &c. ... ... 9d. and £0 1 0

1357 **Tripod Support,** for Globes, Basins, &c. 0 1 0

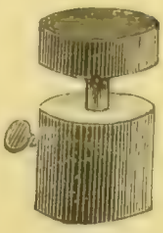
1358 **Blocks of Wood,** Stained Black (set of 6), 4, 2, 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{16}$ in. high and 4 in. square ... per set 0 1 8

1358A „ „ Round, White Wood, 4 in. diam. (set of 6) per set 0 1 6

1359 „ „ Round, Polished Mahogany, 4 in. diam. (set of 6) ... ... per set 0 2 9



1359A



1359B

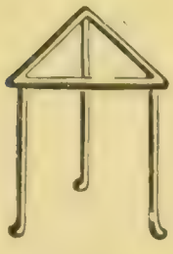
1359A **Block of Wood,** 4 in. diam., with screw, rising from 4 to 6 in. £0 1 4

1359B ,, ,, with Sliding Rod ,, ,, 0 1 4

IRON TRIPODS.



1360



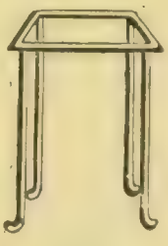
1361



1363



1365



1366

1360 **Tripods,** strong Twisted Wire ... each 4d. and £0 0 6

1361 ,, Stout Iron Triangular—

Height, 6 or 7 in.,	Side of Triangle,	$4\frac{3}{4}$ in.	0	0	9
,, 8 ,,	,,	$7\frac{1}{2}$,,	0	1	0
,, 10 ,,	,,	$9\frac{1}{2}$,,	0	1	5

1363 ,, Round, 6 or 7 ,,	Diam. of Top,	4 ,,	0	0	10
,, 8 ,,	,,	6 ,,	0	1	2
,, 10 ,,	,,	8 ,,	0	1	6

1365 ,, Cast Iron Top, diam. 6 in., height 9 in., with Knobs and Supports, adapted for large or small Vessels ... 0 2 6

1366 **Quadrupods,** Strong Iron, for Drying and Water Ovens, &c.—

Height, $6\frac{1}{2}$ in.	Square at Top,	$6\frac{1}{2}$ in.	0	2	6
,, $7\frac{1}{2}$,,	,,	$7\frac{1}{2}$,,	0	3	3
,, 9 ,,	,,	9 ,,	0	4	0
,, 14 ,,	,,	10 ,,	0	4	6

Galvanized Iron, 6d. to 1/ each extra.

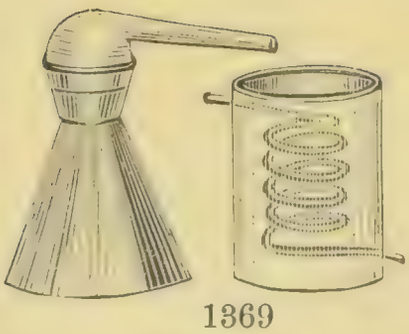


1368

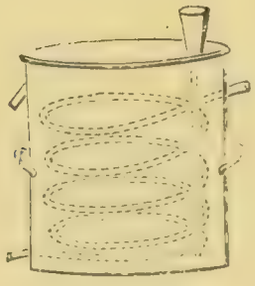
1368 **Stand,** Brangwin's Patent, arranged so that the Carboy is easily placed in frame and secured by ring round the neck, and can be emptied to the last drop—

Without Wheels, Japanned Iron, £1 10s.;			Galvanized Iron	£1	17 6
With Wheels	,,	£1 17s. 6d.	,, ,,	2	7 6

STILLS.



1369





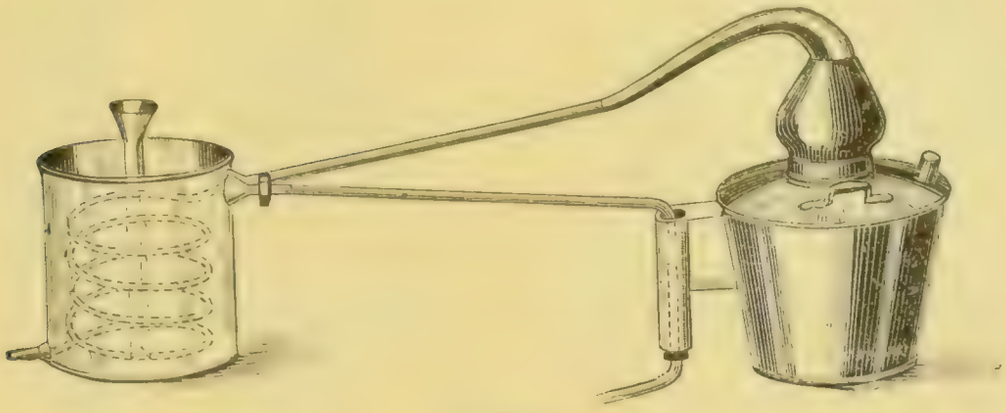
1370

1369 **Still,** Tin Plate, with pure Tin Condensing Worm enclosed in strong zinc Reservoir, complete—

Capacity, 1 quart	...	...	...	£0 10 0
,, 2 ,,	...	...	...	0 13 0
,, 1 gallon	...	...	...	0 17 0
,, 2 ,,	...	...	...	1 7 6

1370 **Still,** Stout Copper, with Pure Tin Worm Condenser in strong zinc Reservoir—

Capacity, 1 quart	...	...	£0 16 0
,, 2 ,,	...	...	1 3 0
,, 1 gallon	...	...	1 17 0
,, 2 ,,	...	...	2 10 0
1372A ,, Condenser only, for above Stills, strong zinc, 2 quarts		...	0 7 6
,, ,, ,, 1 gallon		...	0 11 6
,, ,, ,, 2 ,,		...	0 17 6



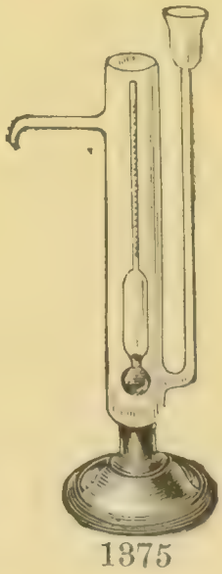
1372B

1372B **Still,** Copper, with Self-filling Arrangement, with Pure Tin Worm Condenser in strong zinc Reservoir, 1 gallon ... £2 2 0

2 ,, ... 2 12 6



1373



1375

1373 **Still,** Copper, to fit a Furnace, with Pure Tin Condensing Worm enclosed in Oak Tub, Galvanized Iron or Zinc—

Capacity 3	4	5	6	10	15	20	25 gallons
£3 10/	£4 5/	£5 10/	£6	£14	£15 10/	£18	£24 complete

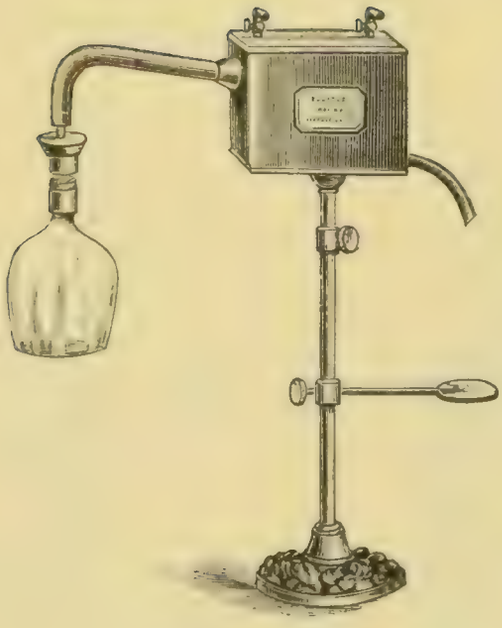
These Stills, up to 6 gallons, can also be adapted to fit the Sheet Iron Furnaces lined with Fire Brick.

1374 **Sheet Iron Furnaces,** to fit the above, for Charcoal, Coke, &c., with Sheet Iron Elbow and 6 ft. of Chimney—

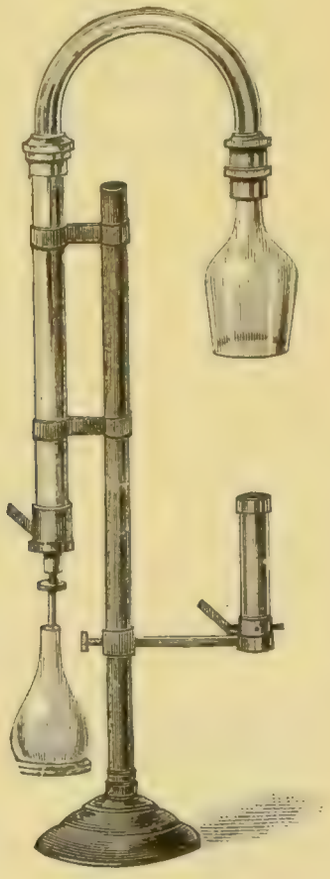
	3	4	5	6	10 gallons
	27/6	32/6	37/6	40/	55/ each
1374A „ Fitted with Burner for Gas only—	15/	18/6	21/	23/	30/ „

1375 **Still Watcher,** Mohr's, for Indicating the Progress of Distillation and Density of the Liquid, on Polished Wooden Foot £0 1 6

Hydrometer for the above ... ... extra 0 1 6



1376



1377

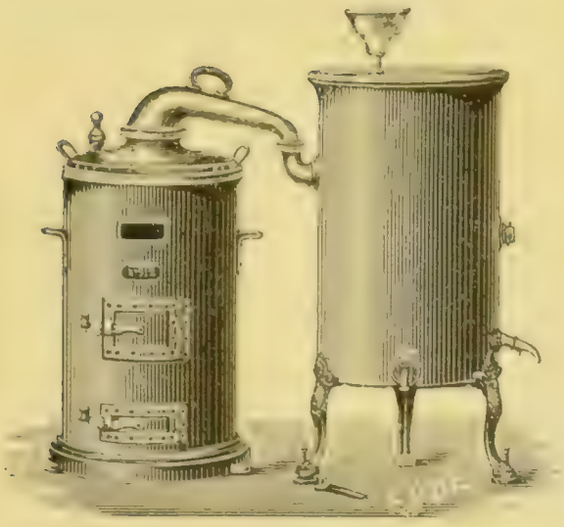
1376 **Still,** Phillip's, Revenue Standard, Condensing, as supplied to the Laboratories of Her Majesty's Inland Revenue and Customs, for estimating the Duties on Wines and ascertaining the Density of Beers, with Bayonet catches ... 3 3 0

Complete Sets of Apparatus (*See Special List*).

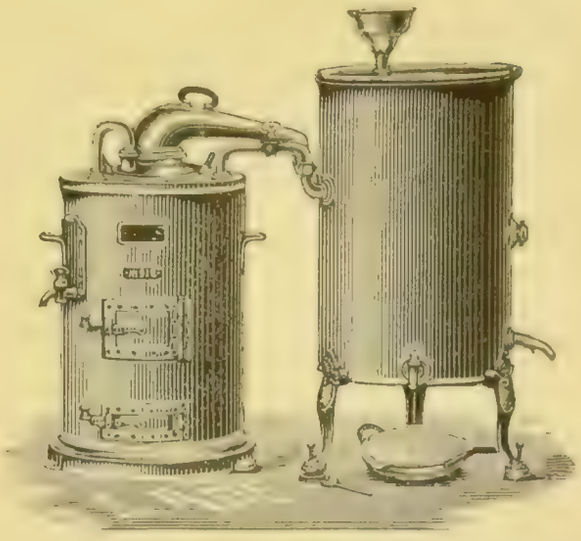
1377 „ Keene's Vertical Condensing Still for Wines, as used at the Customs Laboratory, for either Gas or Spirit, complete 3 10 0

Flasks, for use with above, Wine or Beer, fitted with Bayonet Catches, each 2/. Flasks only, 1/3 each.

DISTILLING APPARATUS.



1378



1379

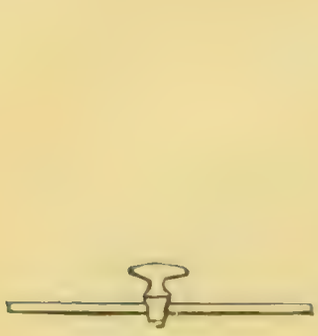
1378 **Portable Still and Condenser,** Alembic Stout Copper, Tinned inside, arranged for removal from Furnace so that it may be used for other purposes. The Alembic is provided with an opening for feeding during operation and is carefully worked so as to be steam-tight. The Copper Condenser has an angular Cooling Tube which can be easily cleaned. The Furnace is made of Wrought Iron—

Capacity of Still	2¼	4¼	6¼ gallons
	£9	£13 10	£15

9	11	13½	17½	22 gallons
£16 10/	£19	£21	£25	£29 10/

1379 **Portable Still and Condenser,** with extra Condenser for Distilled Water. The Furnace is Wrought Iron, Steam Boilers Copper, Tinned inside and closed by strong and finely polished Brass Plates with Water Level attached. The Condenser is large, requiring a less frequent supply of cold water. Angular Condenser Tubes with Plugs for cleaning purposes, with special Worm for Distilled Water—

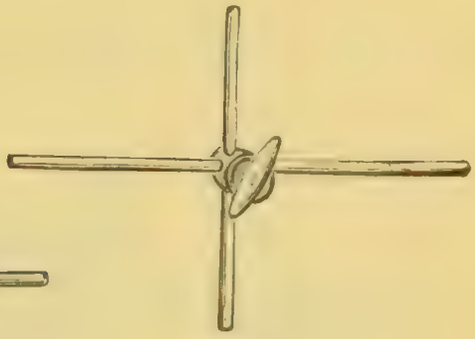
Copper Steam Boiler	5½	6½	10 gallons capacity
Alembic of Tin	10½	18	28 pints
Copper Condenser	5½	22	33 gallons
	£18 5/	£25 15/	£34



1390



1391



1392

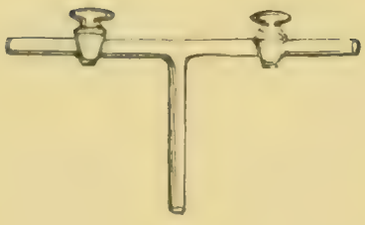
1390 **Stopcock,** Glass, for adapting to Tubes, &c., length 9 in., 2 millimetre bore £0 1 9

3 ,, ,, ... 0 2 6

4 ,, ,, ... 0 3 0

1391 ,, ,, 2 ,, ,, 3 Branches 0 3 0

1392 ,, ,, 2 ,, ,, 4 ,, ... 0 4 0



1393



1394



1395

1393 **Stopcock,** Glass, for adapting to Tubes, &c., length 9 in., 2 millimetre bore, 2 Branches, T Shape ... £0 4 0

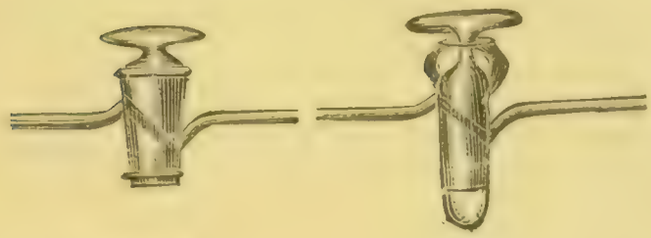
1394 ,, ,, larger, for Aspirators, &c., 4 millimetre bore 0 3 6

,, ,, 5 ,, ,, 0 5 0

,, ,, 7 ,, ,, 0 6 0

,, ,, 10 ,, ,, 0 10 0

1395 ,, Schmidt's Patent, 1 millimetre bore, with Diaphragm in centre 0 1 6

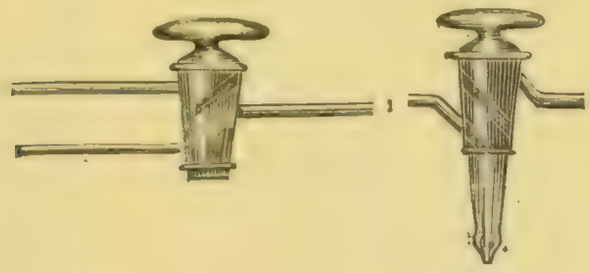


1396 1397

Greiner and Friedrich's Patent Stopcocks, English Patent No. 1709—

1396 **Stopcock,** Simple, 2 millimetre bore ... each £0 3 0

1397 ,, ,, with Mercury Cup ... ,, 0 5 6



1398 1399



1399A

1398 **Stopcock,** 3 way, 2 millimetre bore ... ... each £0 4 0

1399 ,, 3 ,, 2 ,, ,, ... ,, 0 3 6

1399A ,, 3 ,, new form, by Dr. Samway ... ,, 0 4 6



1400 1401 1402 1403 1404

1400 **Stopcock,** Stoneware—

Bore	½	¾	1	1¼ in.
	3/6	5/6	10/	14/ each

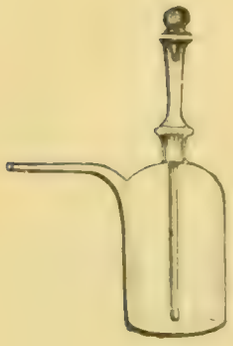
1401 ,, Brass, for Gas, &c., with double Male Screws ... £0 2 0

1402 ,, Brass, Male and Female Screws 0 3 0

1403 ,, Ebonite, small, for Chemical Purposes, 2, 4 and 6 millimetres ... ... each 9d., 1/, and 0 1 3

1404 ,, with Connector and Jet, Brass, small, for Marsh's Arsenic Apparatus 0 3 0

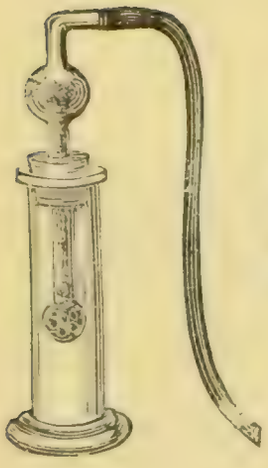
See also Gas Stopcocks, page 106.



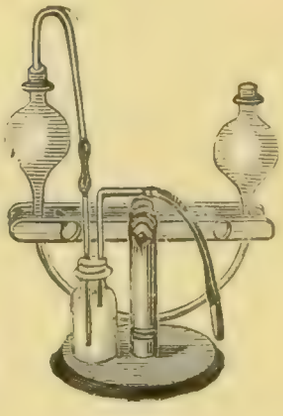
1405



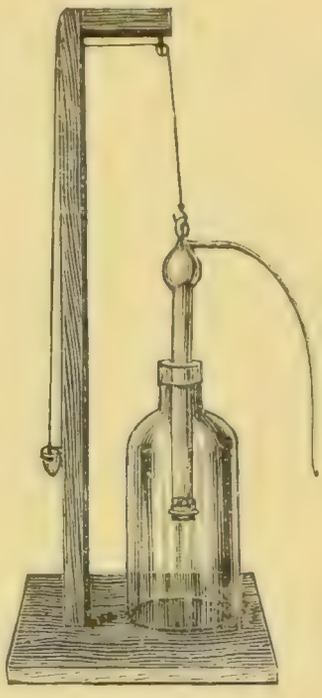
1406



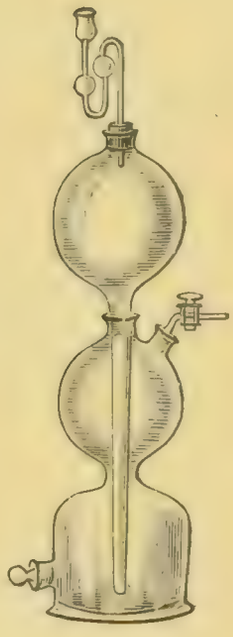
1407



1408



1407A



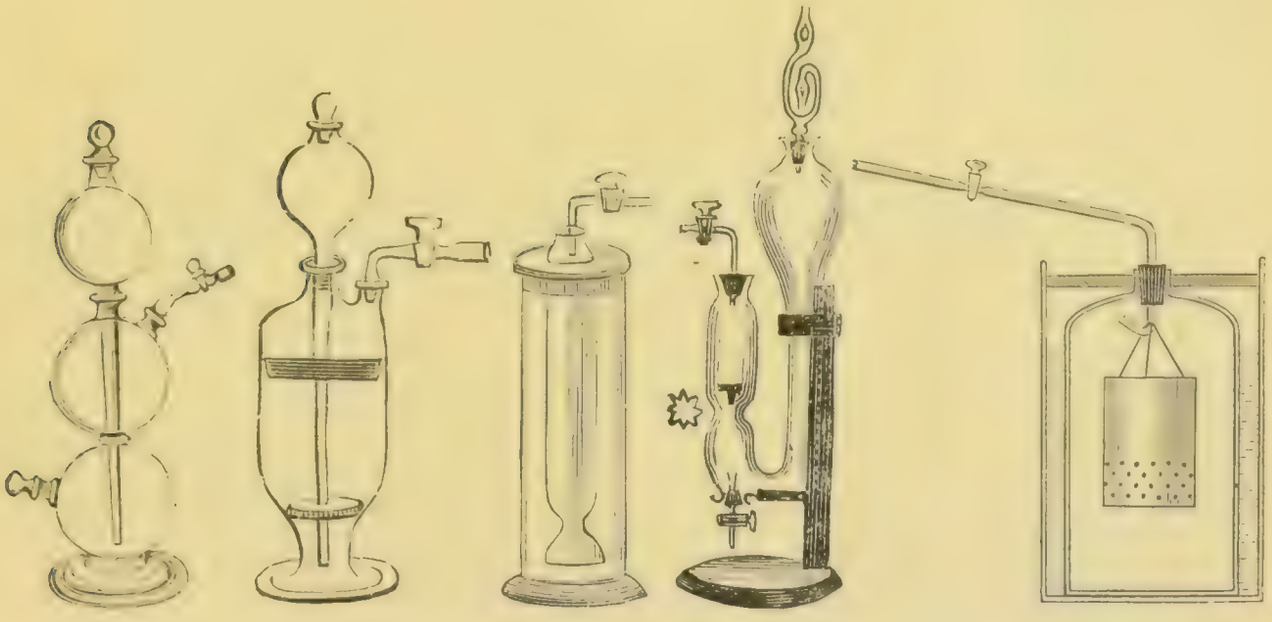
1410

1405	**Sulphuretted Hydrogen Gas Apparatus,** Small ...	£0	1 0
1406	,, Laboratory size, for Testing, on Wooden Stand, complete	0	3 6
1407	,, Coram's, for constant supply. The upper Tube containing the Sulphide of Iron slides through the Cork into the Acid below, and when not in use there can be no possible escape of Gas. Can be used also for Hydrogen or Carbonic Acid Gas	0	2 6
1407A	,, Coram's, suitable for a Laboratory with a number of Students. Mounted on Black Wood Stand, with Flask, &c., complete	0	12 6
1408	,, Babos, with Wash Bottle, on Mahogany Stand ...	0	6 0
1409	,, Tube, with Bulbs only	0	3 0

1410 **Kipp's Sulphuretted Hydrogen Apparatus,** for constant supply, small size ... ... ¼ litre £0 7 6

1411 ,, Medium ... ... ½ ,, 0 10 0

1412 ,, Large ... ... 1 ,, 0 11 0



1413 1414 1415 1416 1416A

1413 **Kipp's Sulphuretted Hydrogen Apparatus,** Bohemian Glass Stopcock and Stoppers, accurately ground, Diam. of centre Bulb, 6 in. £1 1 0

Extra large size ,, ,, 7½ ,, 1 7 6

1414 ,, Bohemian Glass, the Generator is divided in the centre, and accurately ground, with Glass Stopcock 1 12 6

1415 **Sulphuretted Hydrogen Gas Generating Apparatus,** with Cover and Stopcock—Capacity 2 litres 0 9 0

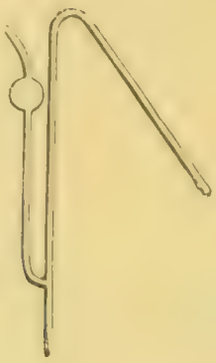
,, 4 ,, ... 0 16 0

1416 **Sulphuretted Hydrogen or Carbonic Acid Apparatus,** for constant supply, with Porcelain Star Disc in Cylinder, 2 Stopcocks, and Safety Funnel with 2 Valves, on Stand 0 15 0

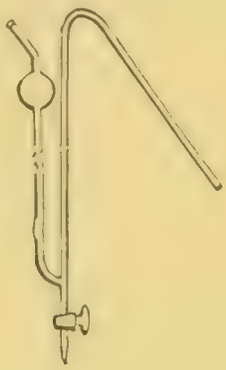
1416A **Moor's Simplex Gas Generator** 0 10 6



1417



1418



1419

1417 **Syphons,** Glass, Plain ... ... each 4d., 6d., and £0 0 8

1418 ,, ,, with Suction Tube, as Fig. 1418, or bent at right angles, either form ... Arm 12 in., each 0 1 0

,, 15 ,, ,, 0 1 1

,, 18 ,, ,, 0 1 4

1419 ,, with Glass Stopcock for Acids, &c. ,, 12 ,, ,, 0 3 0

,, 18 ,, ,, 0 3 6



1420



1421



1423 1425 1422

1420 **Syringes,** Glass—

Capacity	¼	½	¾	1	1½	2 ozs.
	1/6	2/	2/6	3/	4/	5/ per doz.

1421 ,, ,, with bent point for decanting Liquids from Precipitates, 1 oz. £0 0 6

1422 **Test Glasses,** Bohemian Glass, either form, same price—

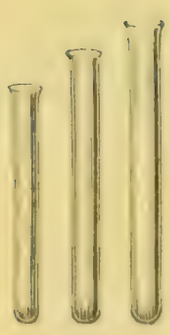
Capacity	1	2	3	4	5	6 ozs.
	3d.	4d.	5d.	6d.	7d.	8d. each

1423 ,, ,, Cylindrical, with Foot, best White Colourless Glass—

Capacity	2	4	6	8	12	16 ozs.
	6d.	7d.	10d.	1/	1/3	1/6 each

1425 ,, ,, Tall, Conical Form, for Urine Testing ... £0 0 10

TEST TUBES.



1426



1427



1430



1432

1426 **Test Tubes,** best Bohemian Glass, for boiling or heating over Spirit Lamps or Gas—

Length	2	2	3	3	3	4	4	4	5	in.
	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	in. diam.
	3d.	3d.	4d.	3d.	3d.	4d.	5d.	6d.	5d.	per doz.
	2/	2/3	2/6	2/6	2/9	3/3	4/6	5/6	4/6	per gross

Length	5	5	5	6	6	6	6	7	in.
	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{3}{4}$	in. diam.
	5d.	6d.	7d.	6d.	7d.	8d.	1/	10d.	per doz.
	4	5/	6/6	5/6	6/	7/6	10/6	9/	per gross

Packed in Cardboard Cases, containing $\frac{1}{2}$ and 1 gross according to size. Quantities less than One Gross charged at per dozen.

1427 **Test Tubes,** nested in Cardboard Cases—Nest of 6 ... each £0 0 9
„ 9 ... „ 0 1 0
„ 12 ... „ 0 1 6

1428 „ „ Nest of 6, largest 5 in. × $\frac{3}{4}$ in. diam., without Cardboard Cases ... per dozen nests 0 6 0

1429 „ „ Ignition, for Blowpipe Purposes—
2 in. × $\frac{1}{4}$ in., per doz. 2½d. ... per gross 0 1 9
2 in. × $\frac{1}{5}$ in. „ 2½d. ... „ 0 1 9

1430 **Boiling Tubes—**

Length	6	6	7	7	7	8	8	8	9	10 in.
	1	1¼	1	1¼	1½	1	1¼	1½	1½	1½ in. diam.
	1/	1/4	1/2	1/6	2/	1/4	1/9	2/3	2/6	3/ per doz.

1431 **Test Tubes,** Hardest Bohemian Combustion Glass, for Oxygen, 6 in. by $\frac{3}{4}$ in. ... ... each £0 0 4
per doz. 0 3 6

1432 „ „ on Foot—

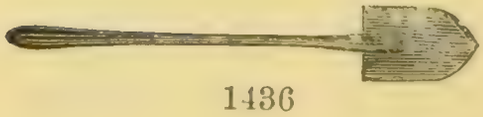
Length	4	5	6	6 in.
	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	1 in. diam.
	1/3	1/6	1/9	2/ per doz.



1433



1439



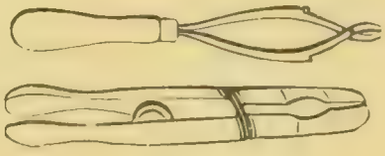
1436



1440A

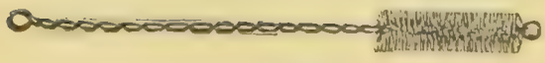


1438A



1441

1440



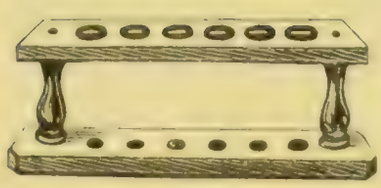
1437



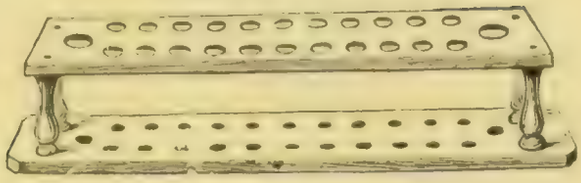
1441A

1433	**Test Tube Cleaners** (Brushes) ...	each 1½d., per doz.	£0	1	0
1434	,, ,, ,,	Best, with Sponge or Bristle ends, each 2d., per doz.	0	1	9
1435	,, ,, ,, ,, ,, ,,	larger 3d., ,,	0	2	6
1436	,, ,, ,,	with flat India-rubber ends ... each	0	0	3
1436A	,, ,, ,,	with Vulcanite Handle ... ,,	0	0	4
		Spare Rubber Ends for above ... per doz.	0	1	6
1437	,, ,, ,,	Long Stem for Tubes, Burettes, &c., 8d. and	0	0	10
1438	,, ,, ,,	Bottle Brushes— ¼ pint 3d., ½ pint 3d., 1 pint 4d., 2 pints 6d.			
1438A	**Brushes,** for	Cleaning Trumpet Tubes, as used in Gas Referees' Testing Apparatus ... each	0	1	0
1438B	,,	for Cleaning Tubes, with Bristles in centre—			
		For ¼ in. Tubes	0	0	2
		,, ½ ,, ,, ...	0	0	3
1439	**Test Tube Holders,**	for the Hand, Brass Wire, in Wood Handle	0	0	6
1440	,, ,, ,,	Turned White Wood	0	0	6
1440A	,, ,, ,,	White Wood, length about 6 in., with Rubber Band ... each	0	0	3
1441	,, ,, ,,	Flat Form, strong Spring Clip, in Wood Handle	0	0	10
1441A	,, ,, ,,	Brass Wire Spring, length about 4¾ in. ... ... each	0	0	7

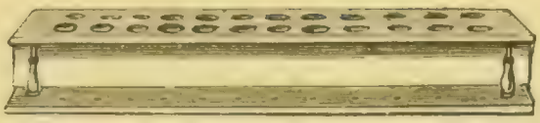
TEST TUBE STANDS.



1442



1442

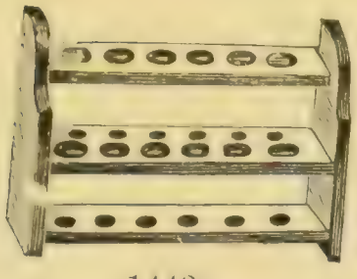


1442A

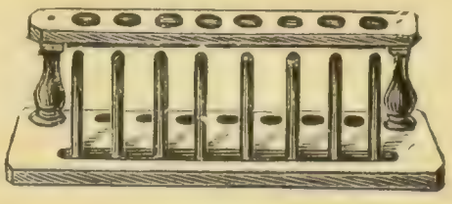
1442 **Test Tube Stand,** Teak, on one Stage—

6	8	12	24 holes
6d.	9d.	1/	2/ each

1442A ,, ,, ,, Lindo's, Mahogany, on one Stage, with 24 Holes, with White Slide passing through centre for Colour Testing, Sugar Analysis, &c. £0 4 0



1443



1447

1443 **Test Tube Stand,** Teak, on two Stages—

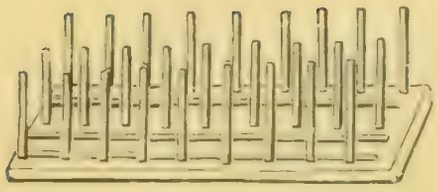
12	18	24 holes
1/	2/	2/6 each

1447 ,, ,, ,, Teak, with Draining Pegs—

6	8	12	24 holes and pegs
1/	1/3	1/10	3/ each

1448 ,, ,, ,, 8 Holes, with Stoneware Draining Pegs ... £0 2 0

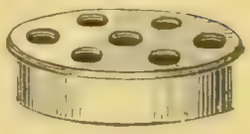
12 ,, ,, ,, ... 0 2 6



1449



1452



1453

1449 **Test Tube Stand,** Teak, Draining Pegs only—

	Set of	12	18	24	36
		1/6	2 3	2 6	3/6

1450 .. .. ,, Stoneware Pegs only—Set of 24 36

3/ 3/6

1452 .. .. ,, Wicker Baskets ... ... each £0 0 6

1453 .. .. ,, Support, Stoneware, with 6 holes for digestion, on Sand Bath 0 0 6

THERMOMETERS.

To reduce Centigrade degrees to those of Fahrenheit.

Rule.—Multiply by 9, divide by 5, and add 32. Thus:—

Cent. Fahr.
$40 \times 9 \div 5 + 32 = 104$

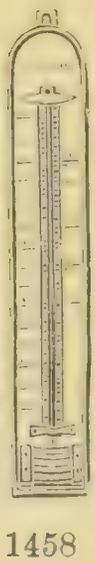
To reduce Fahrenheit's degrees to those of Centigrade.

Rule.—Subtract 32, multiply by 5, and divide by 9. Thus:—

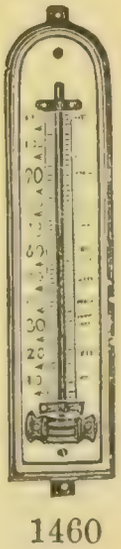
Fahr. Cent.
$104 - 32 \times 5 \div 9 = 40$



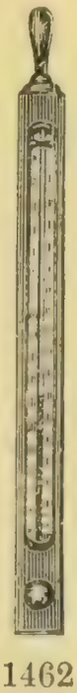
1456



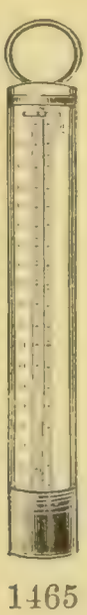
1458



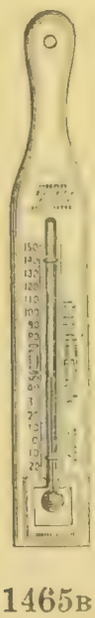
1460



1462



1465



1465B

1456 **Thermometer,** Black Wood, Polished, Double Scale, F. and C., to 140° F., Mercury Column, length 8 in. ... £0 0 9

1457 ,, ,, ,, ,, ,, 10 ,, ... 0 0 10

1458 ,, Boxwood Scale, to 140° F., Mercury Column, Enamelled Tube 0 1 0

1459 ,, ,, to 240° F., Mercury Column 0 1 6

1459A ,, ,, Polished, Double Scale, F. and C., English make, 8 in. 0 2 3

,, ,, ,, 10 ,, ... 0 3 0

1460 ,, bold Figures on Enamelled Glass, and Oak Frame, 10 × 2 in., to 120° F. 0 2 3

1461 ,, White Porcelain, with Black Indelible Figures, 150° F. and 65° C. Similar to Fig. 1460 3/, larger 0 3 6

1462 ,, Bath or Chemical, Paper Scale, enclosed in Glass Tube, protected by an outer White Wood Case, Scale 20° to 130° F., with or without Dr. Forbes' Scale. Total length including Case 14 in. ... 0 1 0

,, ,, ,, ,, ,, 16 ,, ... 0 1 3

,, ,, ,, ,, ,, 18 ,, ... 0 1 6

1465 ,, Plated Scale, Enamelled Tubes, in Japanned Tin Case, for Baths, with Dr. Forbes' Scale, to 140° F.—

Length 8	10	12	14 in.
1/9	2/3	3/3	3/6 each

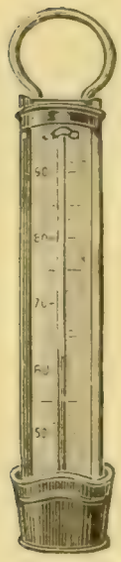
1465B ,, Bath, White Porcelain, with Handle Length, 150 F. 0 2 9

1465C ,, for Brewers' use, in Japanned Tin case, with Enamelled Tube, to 230° F.—

Length 8	10	12	14 in.
1/9	2/3	3/3	3/6 each

1466 ,, Copper Case for Brewers' use, Enamelled Tubes, Plated Metal Scale—

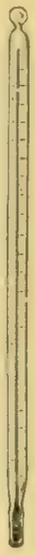
Length 8	10	12	14 in.
2/9	3/6	4/6	5/6 each


1467


1468A


1469


1472


1473


1474


1475

1467 **Thermometer,** for Brewers' use, Best Stout Scale, in Riveted Copper Case, with Scoop, 30° to 220° F.—

Length	10	12	14 in.
	9/	11/	12/6 each

1468 ,, Coolers, Porcelain Scale, 40° to 90° F.—

Length	10	12	14 in.
	10/	12/	13/6 each

1468A ,, Malt Kiln, in Oak Frame, Silvered Metal Scale, Sunk Tube, Metal shoe, total length 18 in., 50° to 230° F. £0 11 6

1468B ,, Blind Scale, for Brewers' use, with corresponding Ivory Scale for Pocket, Riveted Copper Case with Scoop 0 16 0

1469 ,, for Chemical use, Paper Scale, enclosed in Glass Tube about $\frac{5}{8}$ in. diam., and Cardboard Case, to
230° Fahrenheit 0 1 3
350° ,, 0 1 6

1470 ,, ,, ,, ,, 200° Centigrade 0 1 3
300° ,, 0 1 9

1471 ,, Dairy, Paper Scale, $\frac{5}{8}$ in. diam., to 230° F., indicating Freezing, Churning Cheese, and Scalding, length 10 in., in Cardboard Case... ... ... 0 1 0

1471A ,, ,, ,, ,, ,, Floating 0 2 0

1472 ,, for Chemical use, Milk Glass Scale, enclosed in Glass Tube about $\frac{5}{8}$ in. diam., and Cardboard Case—
240° Fahrenheit 0 1 10
350° ,, ... 0 2 3
200° Centigrade 0 2 3
300° ,, ... 0 2 8

1473 **Thermometer,** narrow, to pass through Cork, Paper Scale, enclosed in Glass Tube about $\frac{3}{8}$ in. diam., in Cardboard Case—

240° Fahrenheit	£0	1	6
400° ,, ...	0	1	9
600° ,, ...	0	2	3
100° Centigrade	0	1	6
200° ,, ...	0	1	9
300° ,, ...	0	2	3

1474 ,, for Chemical use, Milk Glass Scale, enclosed in Glass Tube $\frac{3}{8}$ in diam., in Cardboard Case—

240° Fahrenheit	0	2	0
400° ,, ...	0	2	6
600° ,, ...	0	3	0
100° Centigrade	0	2	0
200° ,, ...	0	2	6
300° ,, ...	0	3	0

1475 ,, for Chemical use, best make, accurately graduated on Solid Stem, and Enamelled Back, in Cardboard Case, diam. about $\frac{1}{4}$ in., graduated in single degrees—

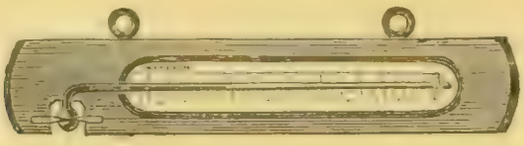
to 150° or 240° Fahrenheit, length 12 in.	0	2	9
1476 ,, to 400° Fahrenheit	0	3	0
1477 ,, to 600° Fahrenheit, length about 16 in.	0	4	0
1478 ,, in Cardboard Case, diam. about $\frac{1}{4}$ in.—			
100° Centigrade, length about 12 in. ...	0	2	9
200° ,, ...	0	3	0
1479 ,, 300° ,, length about 16 in. ...	0	4	0
1480 ,, for Chemical use, double Milk Scale—			
$\frac{5}{8}$ in. diam., about 200° Cent. and 400° Fahr.	0	3	0
1481 ,, $\frac{5}{8}$,, ,, 300° ,, ,, 600° ,,	0	3	6
1482 ,, $\frac{3}{8}$,, ,, 200° ,, ,, 400° ,,	0	4	0
1483 ,, $\frac{3}{8}$,, ,, 300° ,, ,, 600° ,,	0	4	6
1484 ,, Enamelled Back, double Scale, graduated on Stem, about 200° Centigrade and 400° Fahrenheit ...	0	4	6
1485 ,, ,, 300° ,, 600° ,, ...	0	5	6

1485A ,, filled with Nitrogen to prevent the Mercury from separating at high temperatures, Enamelled Back, graduated on Stem—

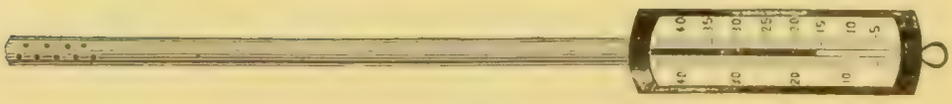
Single degrees 0° to 360° or 400° 5/6 100° to 360° or 400° C. 6/6
100° to 360° or 400° C., $\frac{1}{2}$ degrees, 7/6.

1485B **Thermometers,** for Benzole Testing, Enamelled Back, graduated on Stem, 70° to 130° C., in $\frac{1}{5}$ths, with small Bulb, length 15 in. 0 6 6

1485C ,, for Naphtha, 90° to 200° C., in $\frac{1}{2}$ degrees 0 6 6



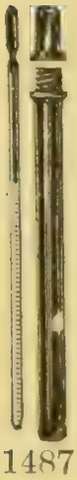
1488AI



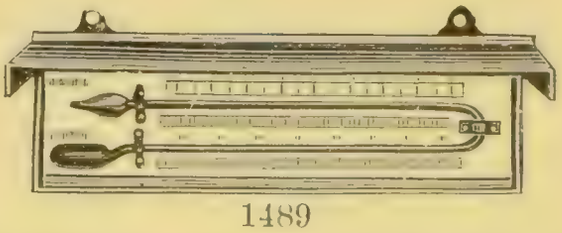
1486



1488



1487



1489



1490



1491



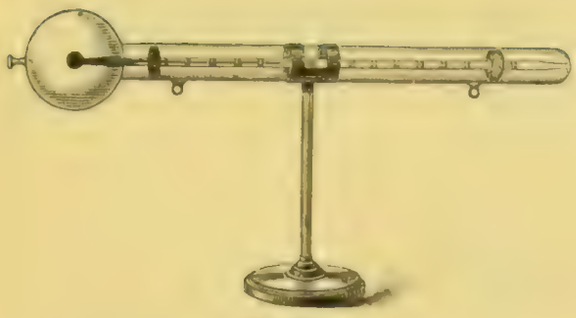
1492

1486 **Thermometer,** Mash Tun, with Metal Scale, 12 in., stout Brass Frame and Screw Guard at bottom—

Total length 4 5 6 ft.

40/ 45/ 50/ each

1487	,,	Clinical, with Indestructible Index, in White Metal Cases ... ... each	£0	2	6
	,,	,, ,, ,, ,, 30 seconds ..	0	3	6
1487A	,,	with patent Magnifying Index	0	4	0
1488	,,	Maximum Self-Registering Boxwood Scale 8 in. 3/6, 10 in.	0	5	6
1488AI	,,	12 in. Opal Scale, Standard Pattern, Engraved Stem, in Polished Mahogany Frame, Maximum 16/6, Minimum	0	15	6
1488B	,,	Minimum Boxwood Scale, Self-Registering, 8 in. 2/, 10 in.	0	3	6
1488C	,,	,, for Garden use, Enamelled Tube, 8 in., Boxwood Scale	0	1	0
1489	,,	Maximum and Minimum Boxwood Scales, in Japanned Tin Case, 10 in.	0	9	0
1490	,,	Sixe's, Self-Registering Maximum and Minimum Boxwood Scale, in Japanned Tin Frame with grooved Magnet ... ... 8 in. 7/, 10 in.	0	9	0
1490A	,,	Zinc Scale ... ... 10 in. 9/6, 12 in.	0	12	6
1490B	,,	Opal Scale ... ... 10 in.	0	13	6
1491	,,	for Specific Gravity Bottle, with Bare Bulb, Ivory Scale graduated to 110° Fahr., in Leather Case ...	0	7	6
1492	,,	for Wine Test, and can be used as a Stirrer, Plated Scale, graduated to 110° Fahr., in Leather Case ...	0	7	6



1492B



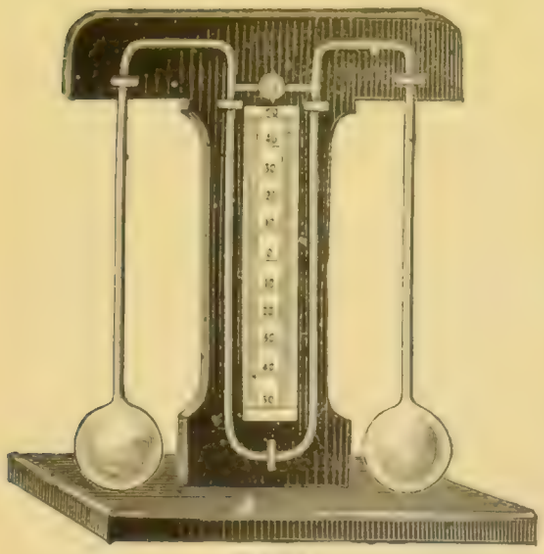
1493



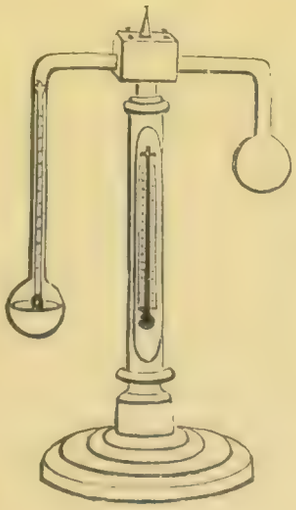
1494

1492A	**Thermometer,** Solar Radiation, with Black Bulb, maximum ...	£0	12 6
1492B	,, ,, ,, ,, in vacuo ...	1	1 0
	Brass Stand for above	0	3 0
1492C	,, Terrestrial Radiation, minimum	0	9 0
1493	,, Leslie's Deferential, on Stand	0	4 0
1493A	,, ,, ,, Milk Scale, Polished Stand	0	6 0
1494	,, ,, ,, ,, with Stopcock	0	8 0

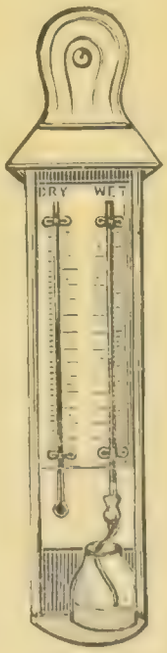
Thermometers for Chemical purposes, Boilers, &c., enclosed in Copper Cases made to order.



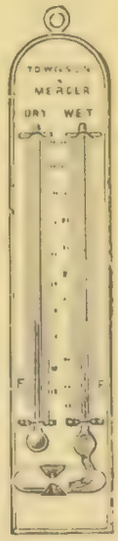
1494A



1494B



1494C



1494E

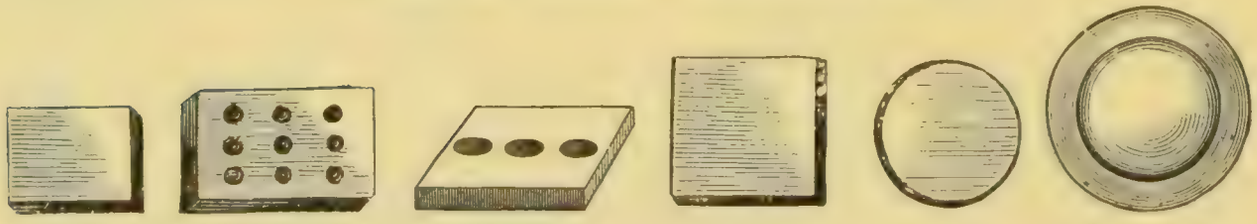
1494A	**Thermometer,** Matthiesen's, large, for Lecture purposes ...	£0	15 0
1494B	**Hygrometer,** Daniel's, on Polished Wood Stand ...	0	12 0
1494C	,, Mason's, Wet and Dry Bulb, on Boxwood Scale, 10 in.	0	8 0
1494D	,, Zinc Scale, Wide Case	0	11 0
1494E	,, Simple form, for School use	0	5 6

1495 **Thermometer Tube,** Plain Stem, 9 in. long, Bulb about $\frac{3}{4}$ in. diameter £0 0 3

1496 ,, ,, filled with Mercury 0 0 6

1497 **Thompson's Calorimeter or Fuel Tester,** for determining the heating power of Coal, &c., complete with directions, in polished Mahogany Case 5 10 0

TILES FOR TESTING.



1498 1500 1500A 1501 1503 1503A

1498 **Tiles,** for Arsenic Testing, Berlin Biscuit Porcelain—

$3 \times 1\frac{5}{8}$	$3\frac{1}{4} \times 2\frac{1}{4}$	4×3	$5\frac{1}{2} \times 3\frac{3}{4}$ inches
6d.	7d.	8d.	9d. each

1500 ,, White Porcelain, with 12 cavities, $4\frac{1}{4} \times 3\frac{3}{8}$ in. ... £0 0 9

1500A ,, ,, 3 ,, $4 \times 1\frac{1}{2}$,, ... 0 0 6

1501 ,, White Stoneware, Glazed on one side—

3	5	6	7	8 inches square
3d	4d.	5d.	6d.	8d. each

1502 ,, White Stoneware, Glazed on both sides—

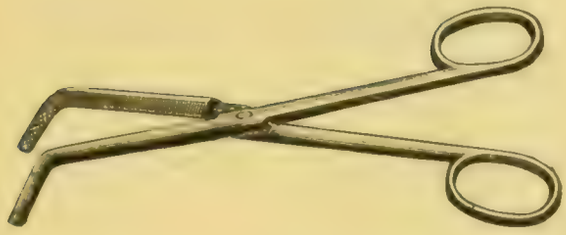
5	6	7	8	10	12 inches square
5d.	6d.	7d.	10d.	1/3	2/ each

1503 ,, Round, Porous, for Drying Crystals—

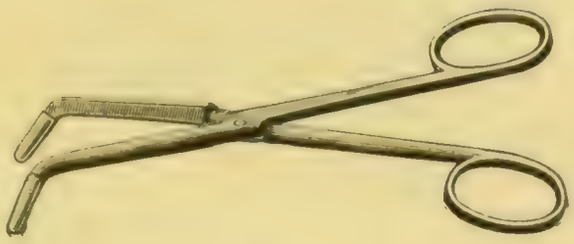
Diameter 5	8	10	12 inches
4d.	8d.	1/	1/6 each

1503A ,, Round, Porous, Plates, for Drying Crystals, about 9 inches diameter ... ... per doz. £0 2 0

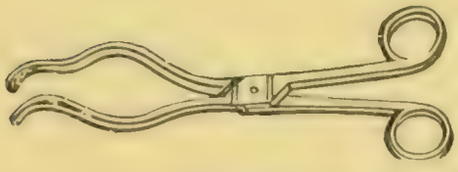
CRUCIBLE TONGS.



1504



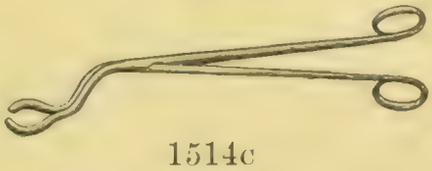
1512



1509



1514A



1514C

1504 **Crucible Tongs,** Bright Iron—

Length	6	7	8	9	11	16 inches
	1/	1/2	1/3	1/6	1/9	3/ each

1505 **Crucible Tongs,** Polished Gun Metal—

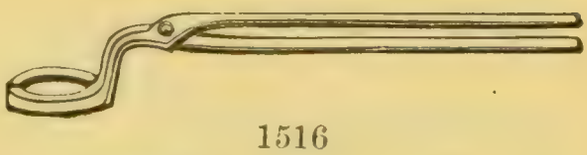
6	7	8 inches
1/	1/3	1/6 each

			£	s	d
1506	,,	German Silver, 8 inches	£0	2	6
1509	,,	,, ,, with Bow, 8 inches ...	0	2	9
1508	,,	Gun Metal, with Bow, 9 inches... ...	0	2	6
1508A	,,	Polished Iron, with Bow, 8 inches ...	0	1	8
1514	,,	Pure Nickel, with bow, 8 inches ...	0	5	0
1507	,,	Light Steel, 8 inches	0	2	3
1510	,,	Strong Polished of Square Steel, 8 inches ...	0	1	6
1512	,,	German Silver, 8 inches, with Platinum Ends	0	12	0
1513	,,	Gun Metal, 8 inches, with Platinum Ends ...	0	12	0
1514A	,,	Iron, in Wooden Handle, 9 inches, with Patent Spring Attachment, with Regulating Screw	0	2	0
1514B	,,	,, ,, without Regulating Screw	0	1	9
1514C	,,	Brass, with Bend and Bow for Small Crucibles, 8 inches	0	2	6

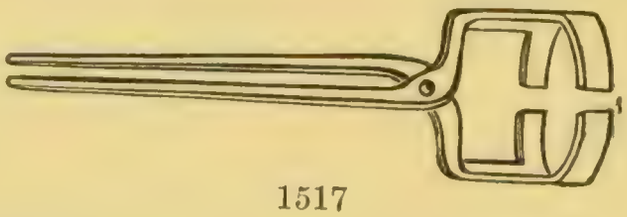
ASSAY TONGS.



1515

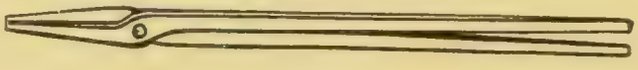


1516



1517

1515	**Bow Tongs,** Iron, length 14 inches	£0	2	0
	,, ,, 18 ,, ...	0	2	3
	,, ,, 24 ,, ...	0	2	6
1516	,, ,, with bend, length 14 inches	0	2	9
	,, ,, ,, 20 ,, ...	0	3	3
1517	**Basket Tongs,** Iron, length 24 inches	0	6	0
	,, ,, 28 , ...	0	7	6
	,, ,, 32 ,, ...	0	9	0



1518



1519



1520

1518	**Straight Tongs,** Iron, length 14 inches	£0	1	6
	,, ,, 18 ,, ...	0	1	9
	,, ,, 24 ,, ...	0	2	0
1519	**Furnace Tongs,** with bend, length 14 inches	0	1	6
	,, ,, 18 ,, ...	0	1	9
	,, ,, 24 ,, ...	0	2	0
1520	**Charcoal Tongs,** length, 14 inches	0	1	6
	,, 16 ,, ...	0	1	9
	,, 18 ,, ...	0	2	0



1521

1521	**Cupel Tongs,** long Steel, for removing Cupels, length 30 inches	0	3	0
	,, 36 ,,	0	3	6

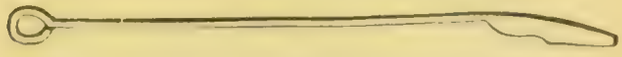


1523

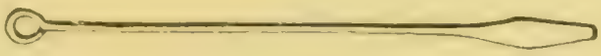
1523 **Scorifier Tongs,** Steel, with Spring, length 24 inches ... £0 3 0
„ 32 „ ... 0 3 6



1524



1525



1526

1524 **Iron Poker,** for arranging Fuel in Furnace, length 3 feet ... £0 1 6

1525 **Bar Scraper,** length 3 feet 6 inches 0 2 0

1526 **Long Bar Scraper,** Chisel form 0 2 6



1527



1528



1529



1530

1527 **Triangle,** Iron Wire, to support Crucibles £0 0 1

1528 „ „ covered with Pipe Clay, per doz. 1/9, each 0 0 2

1528A „ Nickel Wire ... ... each 4d. and 0 0 6

1529 „ Malleable Iron 3 inches 0 0 2
„ 5 „ 0 0 3

1530 „ Stout Iron, without Arms, 4¾ „ 0 0 4
„ „ 7½ „ 0 0 6
„ „ 9½ „ 0 0 8



1531



1533A

1531 **Trough,** Porcelain, Cooler for Beer and Wine estimation.
Length 14½ in., width 4¾ in., height 3¼ in £0 12 6

Tripods. (*See Stands.*)

Tube, Glass. (*See Glass Tube.*)

1532 **Tube,** Best Vulcanised Rubber, for Connections, Gas, &c.—

Diam. internal	1/16	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1 inch
Red	2d.	2d.	3d.	4d.	5d.	7d.	10d.	1/4	1/9	2/3	2/6 per ft.
Black	2d.	2d.	3d.	4d.	6d.	8d.	10d.	1/4	1/9	2/6	3/ per ft.

The above prices are for the ordinary thickness of Tube used for Connections, Gas Burners, &c.; if required thicker it will be charged accordingly.

1532B **Extra Thick Gas Tubing,** strong, pliable, will not kink, and resists the odour of gas better than any other soft tubing—

¼	5/16	⅜	½ inch
3½d.	4½d.	6d.	8d. per foot

Other sizes supplied to order.

1533 **Tube,** best Vulcanised Rubber, Red, for Pressure—

Diameter internal, ⅛ in. External, ½ in., per foot ... £0 1 3
5/16 ,, ¾ ,, ,, ... 0 2 0
¼ ,, ½ ,, for Filter Pumps 0 0 10

1533B Ditto Black, with one ply of Canvas for greater pressure—

Diameter internal 3/16 in. External ½ in., per foot ... 0 1 4
¼ ,, ½ ,, ,, ... 0 1 0
5/16 ,, ¾ ,, ,, ... 0 2 4

1533A **Tube,** Metal, Flexible, for Gas, suitable for Bunsen's Burners, 5/16 in. internal diameter, with India Rubber Connections both ends, in lengths of 3 ft., Steel Turned 0 2 6
,, ,, ,, Copper Bronzed ... 0 3 6



1534



1535

1534 **Tubes,** Berlin Porcelain, Glazed inside and out, for heating in a Furnace—

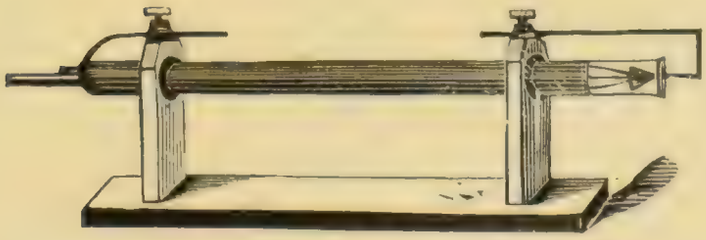
Length	12	20	20	20	20	26	26	26	26 in.
Dimensions	½	½	¾	1⅛	1½	¾	1⅛	1¾	2 in. external
	3/9	6/3	7/9	9/3	12/6	8/6	12/	16/	18/ each

1535 **Tubes,** Meissen or Dresden Porcelain, glazed inside, biscuit outside—

Length 25 inches, diameter external	½ inch	...	£0	1 6
25 „ „ „	¾ „	...	0	2 3
25 „ „ „	1 „	...	0	2 6
25 „ „ „	1¼ „	...	0	4 0

1535A „ Iron, closed at one end for Combustion—

Length 24 inches, diameter internal	½ inch	...	0	2 0
24 „ „ „	¾ „	...	0	2 6



1538

1537 **Tube, Ozone Induction,** covered with Tin Foil... ... 0 6 0

1538 „ „ on Polished Mahogany Stand, complete 0 10 6

TUBES OF LIGHT BLOWN GLASS FOR ORGANIC ANALYSIS, &c.



1539 1539A 1540 1541 1542 1543

1539, 1540 **Tubes,** Chloride of Calcium, U form 1539, or V Form 1540—

Length of Limb	3	4	5	6	8	10	12 in.
Diameter	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1 in.
	3d.	4d.	5d.	6d.	8d.	1/	1/3 each
1539A With Side Tubes	5d.	6d.	7d.	8d.	10d.	1/2	1/5 each

1541 **Tubes,** U Form, with Bulbs—

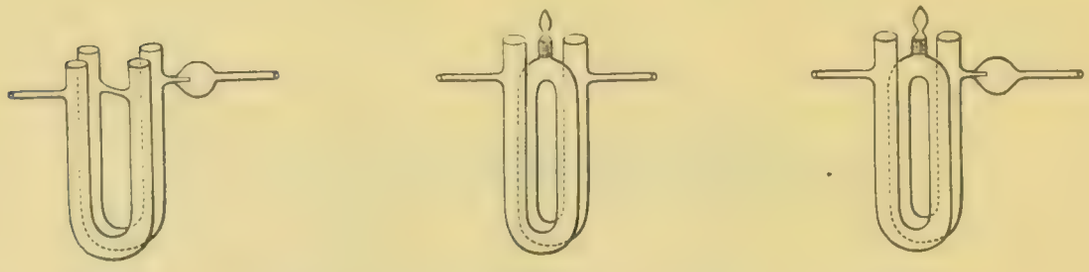
Length of Limb	4	5	6	7	8	10 in.
Diameter	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$ in.
	8d.	9d.	1/	1/3	1/6	1/9 each

1542 **Tubes,** U Form, Stoppered—

Length	3	4	5	6	8 in.
Diameter	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$ in.
	11d.	1/3	1/4	1/6	1/9 each

1543 U Form, Stoppered, with hole in Stopper—

Length	3	4	5	6	8 in.
Diameter	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$ in.
	2/	2/6	2/9	3	3/6 each

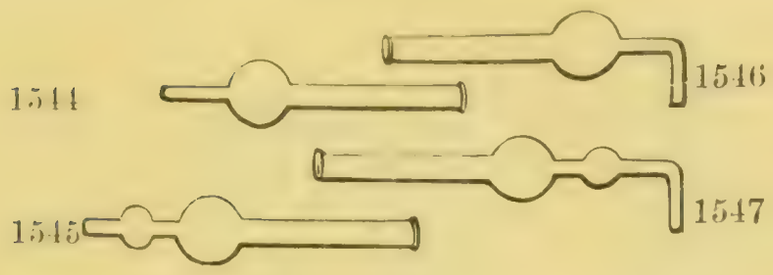


1543A 1543B 1543C

1543A **Tube,** Chloride of Calcium, double, 6 in. × $\frac{5}{8}$ in., with Side Tubes and Bulb ... ... each £0 3 0

1543B ,, Double, 6 in. × $\frac{5}{8}$ in., with Side Tubes and Stopper at top ... ... each 0 3 6

1543C ,, Double, 6 in. × $\frac{5}{8}$ in., with Side Tubes and Bulb, with Stopper at top ... ... each 0 4 0



1544, 1545 **Tube,** Chloride of Calcium, for Drying Gases, &c.—

Length.	One Bulb (1544).	Two Bulbs (1545).
4 inches ...	each 2d., per doz. 1/3	each 2d., per doz. 1/8
6 ,, ...	,, 2d., ,, 1/9	,, 3d., ,, 2/6
8 ,, ...	,, 3d., ,, 2/6	,, 5d., ,, 3/

1546, 1547 **Tube,** with Bend—

Length.	One Bulb (1546)	Two Bulbs (1547)
6 inches ...	each 2d. ...	each 4d.
8 ,, ...	,, 3d. ...	,, 6d.



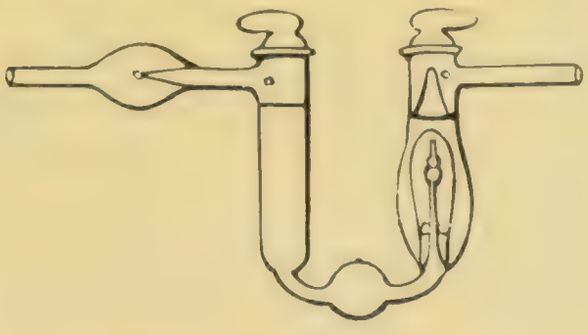
1548 **Tube,** Chloride of Calcium, Marchand's, with Two Bulbs and Connecting Tube—

Length of Limb 4 inches ...	Diameter $\frac{1}{2}$ inch, each	£0	0	9
,, ,, 5 ,, ...	,, $\frac{5}{8}$,, ,,	0	0	10
,, ,, 6 ,, ...	,, $\frac{3}{4}$,, ,,	0	1	0

1549 ,, Chloride of Calcium, Marchand's, with Tube passing into small Bulb to prevent moisture sucking back—

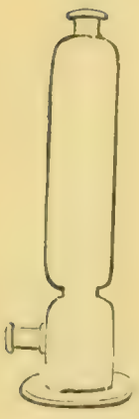
$4 \times \frac{1}{2}$	$5 \times \frac{5}{8}$	$6 \times \frac{3}{4}$ in.
9d.	10d.	1/ each

1550	,,	Marchand's Form, Modified by Vollhard ...	each	£0	1	0
1551	,,	,, ,, Fresenius	,,	0	1	0

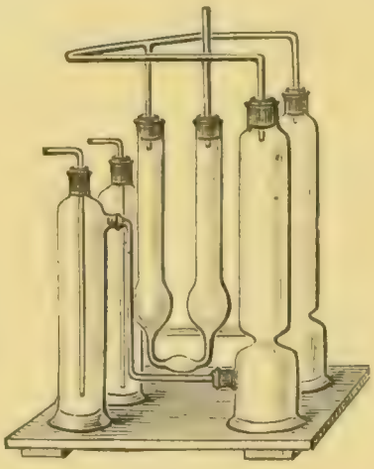


1552

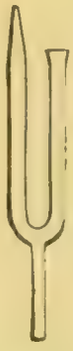
1552 **Tube,** Chloride of Calcium, Schmitz, Limbs about 8 in. ... £0 6 0

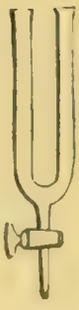

1553


1554


1554A


1555


1555A


1556

1553 **Tube,** Cylindrical, with Tubulure at side, for Drying Gases, &c. –

Length	8	10	12	14	16 in.
Diameter	1½	2	2	2¼	2½ in.
	1/6	1/9	2/	2/6	3/ each

1554 „ Cylindrical, Fresenius Improved, with extra Tubulure at the Top, and Hole drilled in Stopper—

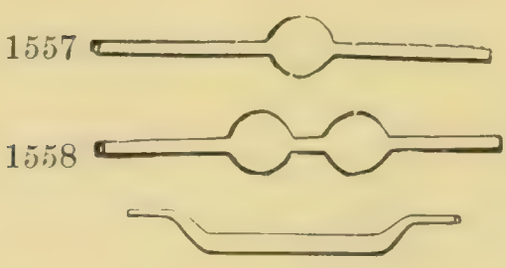
Length	8	10	12	14	16 in.
Diameter	1½	2	2	2¼	2½ in.
	4/6	5/	5/6	6/6	7/ each

1554A „ Drying, for use with Chloride of Calcium, set of 4, mounted on Stand £1 0 0

1555, 1555A **Tubes,** Y Form, Plain—

	5×½	6×½	8×¾	10×⅞	12×1⅛ in.
	1/	1/3	1/6	2/	2/6 each

1556 **Tube,** Y Form, with Stopcock, 7×⅝ in. 0 3 0


1557

1558

1559


1560

1557 **Tube,** Reduction, Hardest Combustion Glass, 1 Bulb each £0 0 6

1558 „ „ „ „ „ 2 Bulbs „ 0 0 7

1559 „ „ Hard Glass, 9 in. long 0 0 8

1560 „ W Form, length of Limbs 5 in., diam. ⅝ in. ... 0 1 3



1561

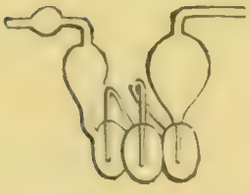


1562

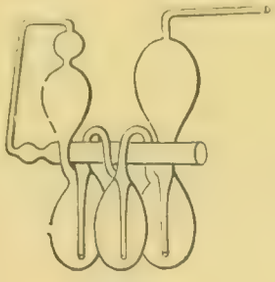
1561 **Tube,** Combustion, Hardest Glass, Bent and Drawn for use, diam. $\frac{5}{8}$ in., length 16 in. each 7d.; 20 in. 10d.

Other sizes to order.

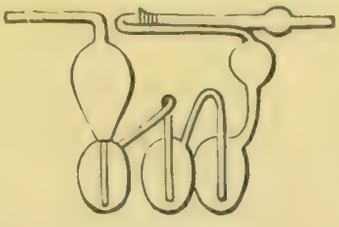
1562 **Liebig's Potash Bulb,** in Case £0 1 3



1563



1564

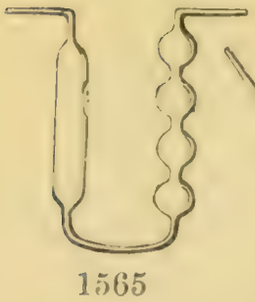


1564A

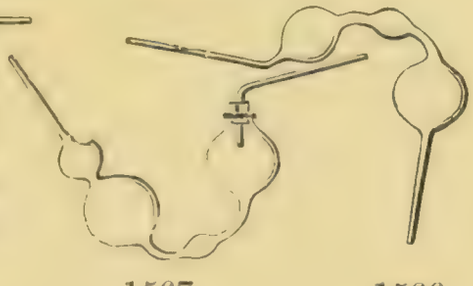
1563 **Geissler's & Mohr's Bulbs,** in Case... ... ... £0 2 0

1564 ,, with Chloride of Calcium Tube attached ... 0 2 3

1564A ,, ,, ,, ground to Tube ... 0 2 6

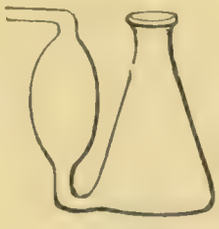


1565

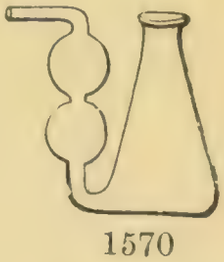


1567

1566



1569



1570

1565 **Mitscherlich's Potash Bulbs** £0 1 0

1566 **Nitrogen, Will & Varrentrap's Potash Bulbs,** per doz. 0 7 6

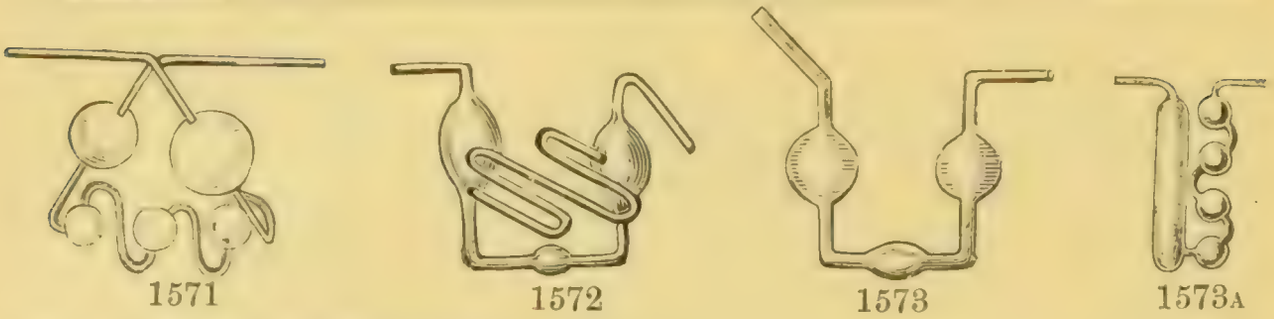
each 0 0 8

1567 ,, **Shepherd's,** with Bent Tube and Cork 0 0 10

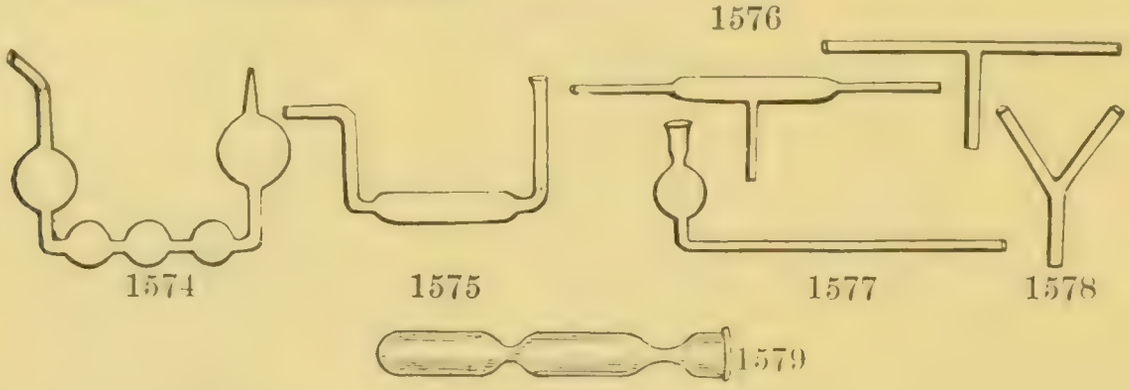
1568 ,, ,, ,, with Stopper 0 1 0

1569 ,, ,, 1 Bulb, modified by Vollhard 0 0 10

1570 ,, ,, 2 Bulbs ,, ,, 0 1 0



1571	**Liebig's Potash Apparatus,** new form	£0	1	4
1572	**Schloesing's** „ „	0	1	4
1573	**Will & Varrentrap's** ditto, French form	0	0	9
1573A	**Kohninck's Potash Bulbs**	0	1	0

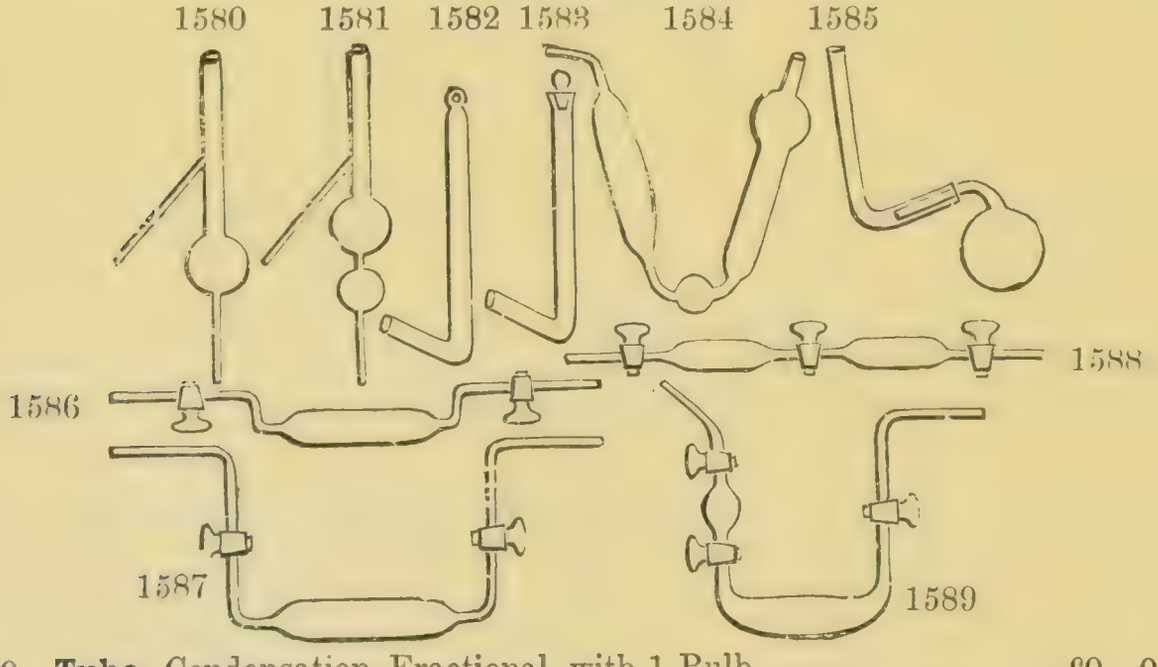


1574	**Ure's 5 Bulbs**	£0	1	9
1575	**Liebig's Drying Tube**	0	0	8
1576	**Three-Limb Tubes** ... ... each 4d. and	0	0	6
1577	**Suction Tube**	0	0	3
1578	**Three-way Tubes,** Y or T form—			

$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$ in. diam.
3d.	3d.	4d.	5d.	6d. each

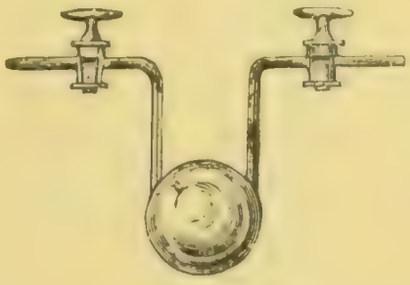
1579	**Tubes for Sulphur Estimation**	0	0	6

CONDENSATION TUBES FOR FRACTIONAL DISTILLATION.

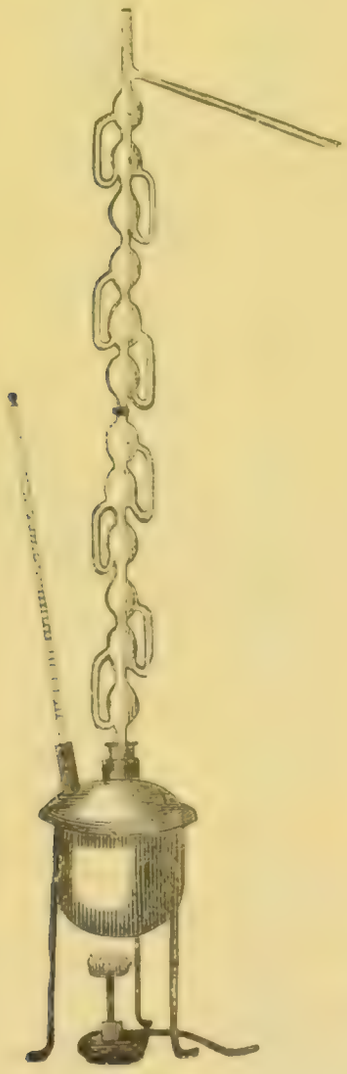


1580	**Tube,** Condensation, Fractional, with 1 Bulb	£0	0	6
1581	„ „ „ „ 2 Bulbs	0	0	8

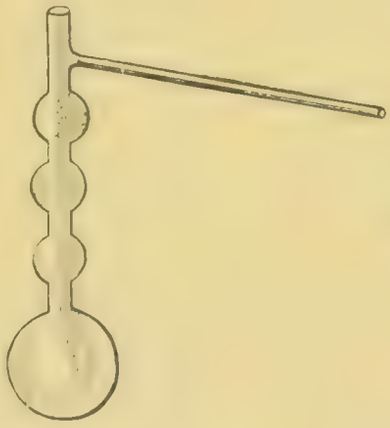
1582	**Cooper's Receiver,** Plain	£0	0	6
1583	,, ,, Stoppered	0	0	9
1584	**Kerr's Gas Tube**	0	1	3
1585	**Clark's Retort and Condenser**	0	0	8
1586, 1587	**Gas Condensation Tubes,** with 2 Stopcocks, for Cyanogen, &c.	0	5	6
1588, 1589	,, ,, with 3 ditto ditto ...	0	7	6



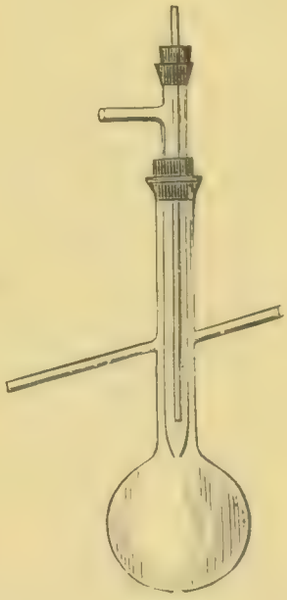
1589A



1590



1593



1594

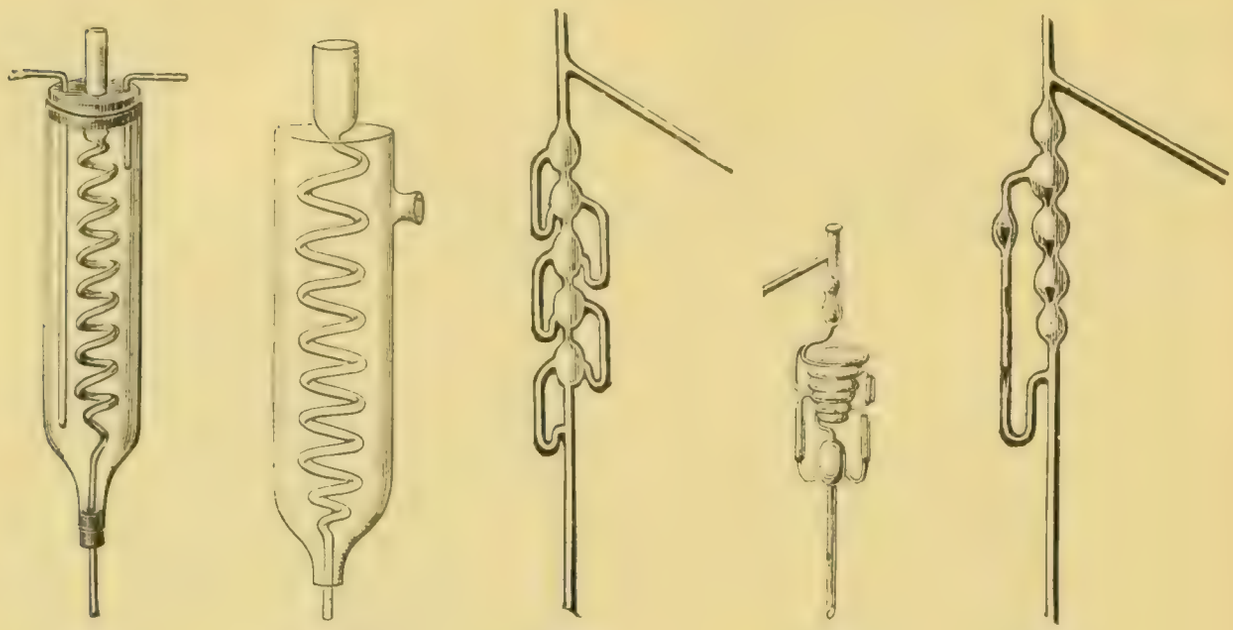
1589A	**Condensation Bulb,** 2 Stopcocks, for Sulphurous Acid ...	£0	4	0
1590	**Benzole Testing Apparatus,** Copper Vessel about 1 quart capacity, with Fractional Tube, 12 Bulbs, Thermometer Stand and Burner complete	2	2	0

1593 **Ladenberg's Fractional Distillation Flask,** with 3 and 4 Bulbs—

100	150	250	500	1,000 c.c.
1/	1/2	1/6	2/	2/6 each

1594 **Kreusler's** ditto ditto, with Inner Tube—

125	250	500	750	1,000 c.c.
1/2	1/6	2/	2/6	3/ each



1595 1595A 1596 1596A 1597

1595 **Spiral Worm Condenser,** in Tube, complete—

Outer Tube	6×1	8×2	9×2½	10×3 in.
	2/	2/6	3/	4/ each

1595A ,, With Tubulure at Side 2/3 2/9 3/3 4/3 each

1596 **Fractional Distillation Tubes,** Le Bel Henninger, for Benzole determinations—

2	3	4	5	6 bulbs
2/	3/	4/6	6/	8/ each

1596A **Fractional Distillation Tube** £0 12 0

1597 ,, ,, ,, Glynsky's, 5 bulbs with 3 Glass Balls inside—the Platinum Gauze Cones used in the Bell Henninger's Tubes not being required—

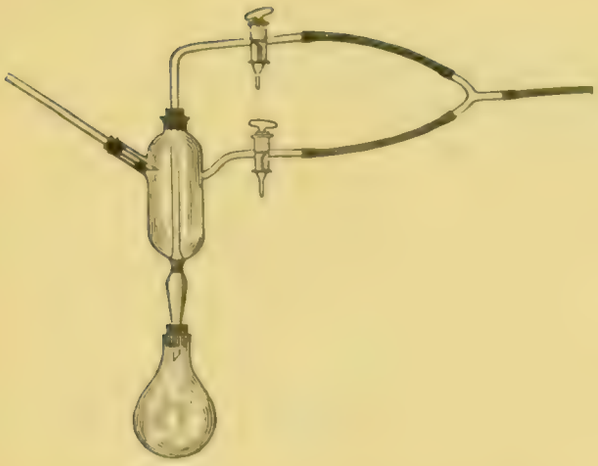
Small	Medium	Large
3/6	4/	4/6 each



1599 1600

1599 **Mayer's Apparatus,** for estimation of Sulphur in Iron by Bromine Water £0 5 0

1600 ,, ,, with Stopcock 0 8 0



1600A



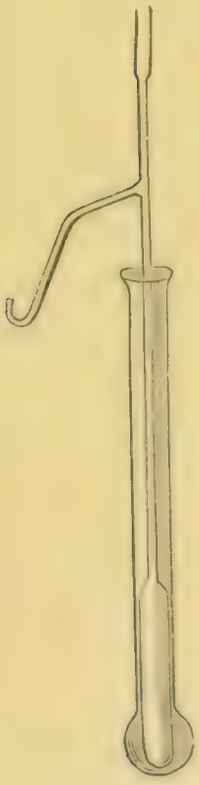
1601A



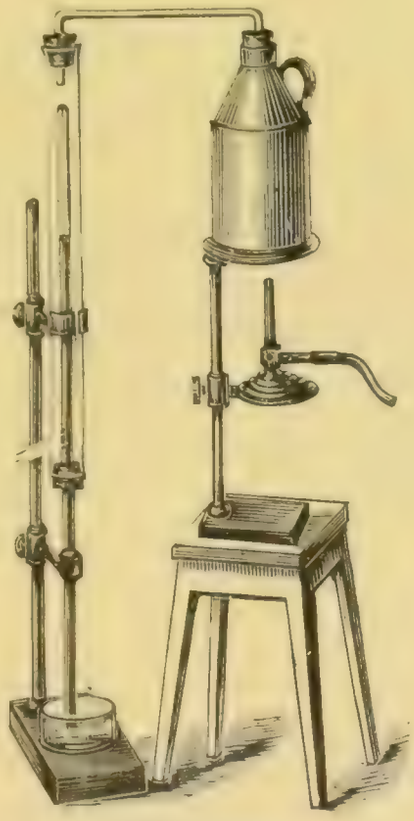
1601B

1600A **Fractional Distillation Apparatus,** Lothar Meyer ... £0 12 6

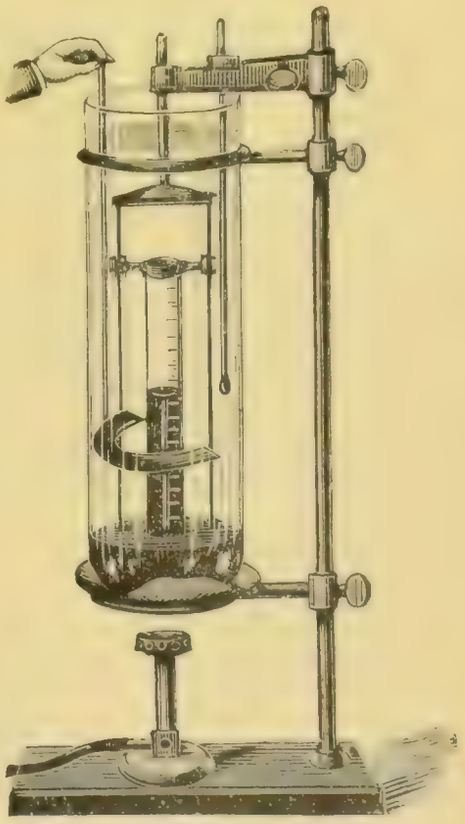
1601 **Vapour Density Bulb,** Dumas, A or B 0 0 7



1602



1604 & 1605



1606

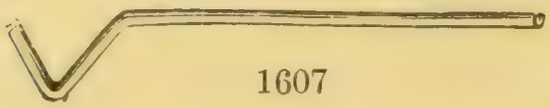
1602 **Vapour Density Bulb Apparatus,** Victor Meyer ... £0 5 0

1603 ,, **Tubes,** Stoppered, small, for use with above, per doz. 0 5 0

1604 ,, **Density Apparatus,** Hofmann's, Glass part only ... 0 10 0

1605 ,, ,, ,, complete with Wood Stand, 2 Iron Stands with Clamps, Bunsen's Burner, Glass Dish and Tin Can 1 10 0

1606 ,, ,, Gay Lussac's, complete with Stand and Clamps, Thermometer, Bunsen's Burner, &c. 1 7 6



1607



1608



1609

1607 **Tube, Combustion,** Hard Glass, Closed and Bent ... £0 0 9

1608 „ **Diffusion,** length 24 in. 0 0 9

1609 „ **Capillary**—

Length	18	18	18	18	18 in.
Diameter of Bulb	1	1½	2	2½	3 in.
	4d.	6d.	9d.	10d.	1/ each



1610



1612



1617

1610 **Tubes, Bulb** (Bulb Tubes)—

Capacity	½	1	1½	2 oz.
	1/3	1/6	2/	2/6 per doz.

1611 **Acid Floats** ... ... per doz. £0 6 0

1612 **Berzelius' Wash Bottle Tube** ... ... each 0 0 6

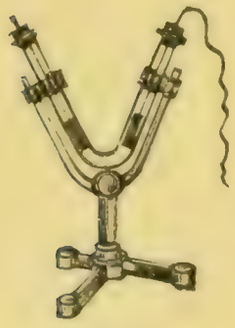
1616 **Vaccine Tubes,** in Tube ... ... per bundle 0 1 0

1617 **Valinches,** Glass, Bulb and Cylindrical, Capacity ¼ litre ... 0 0 8

„ „ „ „ ½ „ .. 0 1 0

„ „ „ „ 1 „ ... 0 1 6

HOFMANN'S APPARATUS FOR DECOMPOSITION AND VOLUMETRIC ANALYSIS.



1619



1622

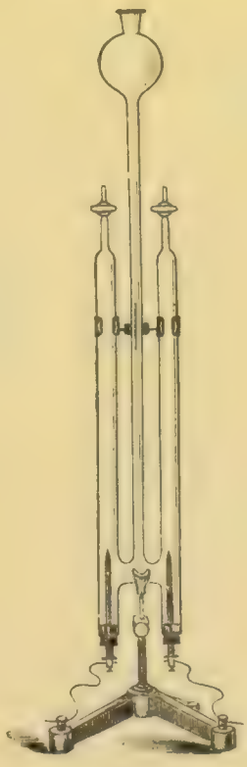


1625

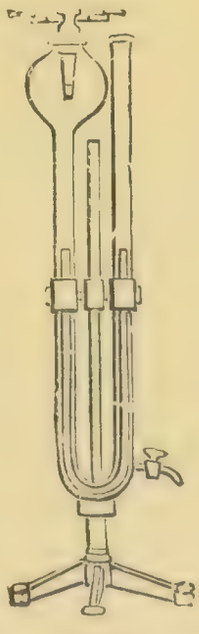
1618	V form, with 2 Platinum Electrodes for the Electrolysis of Hydrochloric Acid, Water and Ammonia	£0 7 6
1619	**Iron Tripod Stand,** with Brass Mounts	0 5 0
1622	U form, with 1 Stopcock and Platinum Electrodes, to ascertain the quantity of Hydrogen contained in one volume of Hydrochloric Acid	0 6 0
1623	U form „ „ „ graduated to 50 c.c.	0 8 6
1625	U form, with 2 Stopcocks and Platinum Electrodes ...	0 7 6
1626	U form, with 2 Stopcocks and Platinum Electrodes, and graduated into c.c.	0 13 0
1627	**Iron Tripod Stand,** Universal, with Brass Rod and Fittings for the above	0 8 0



1628



1630



1632



1638

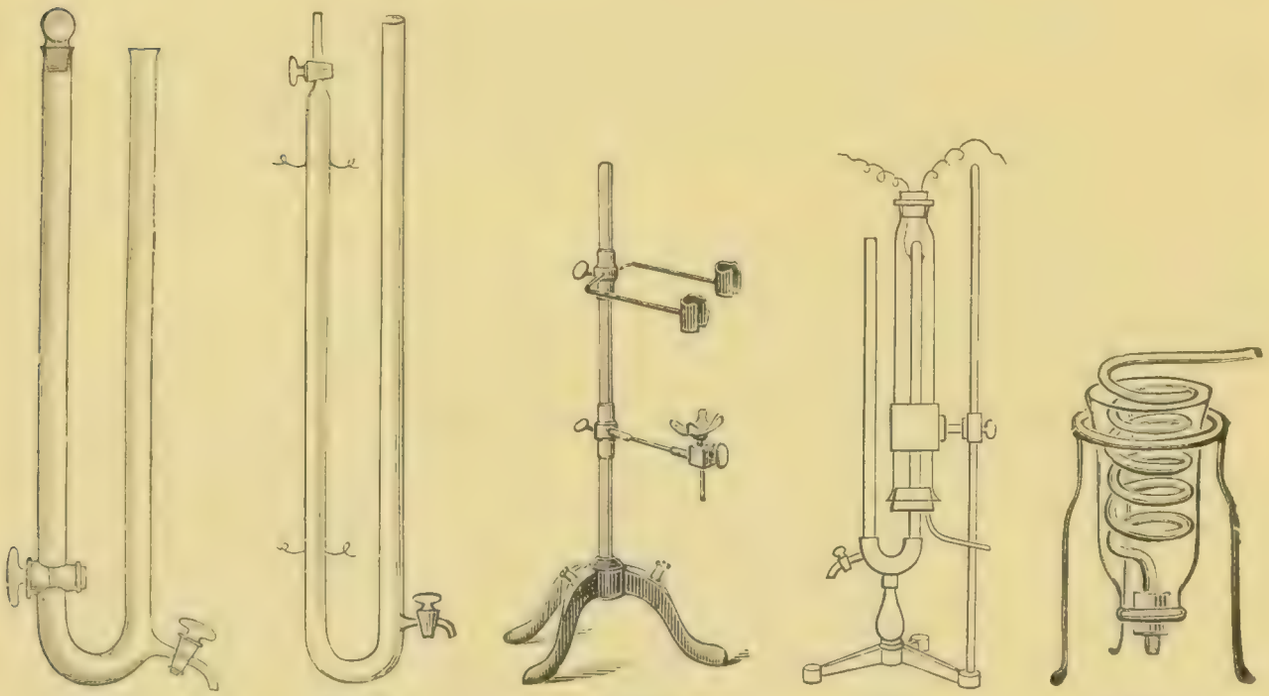
1628 **Tube,** for Decomposition of Water into one of Oxygen and two of Hydrogen with 2 Stopcocks and Platinum Electrodes, and Bulb-Reservoir £0 12 0

1630 ,, for Electrolysis of Hydrochloric Acid with Carbon Electrodes 0 12 0

1631 ,, Platinum Electrodes, fitted in Rubber Corks, for use with above apparatus, for showing Decomposition of Water extra 0 5 0

1632 ,, for Electrolysis of Carbonic Acid and Sulphurous Acid, with 1 Stopcock and Platinum Electrodes 0 12 6

1638 **Hofmann's Apparatus,** to determine the quantity of Elementary Gases contained in one volume of Hydrochloric Acid, with 3 Stopcocks 0 12 6



1641 1647 1633 1634 1635

1641 **Hofmann's Apparatus,** for Volumetric Decomposition of Ammonia by Chlorine and Hypobromide Sodium, with 2 Stopcocks £0 12 0

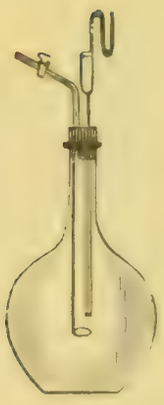
1647 ,, to illustrate the Electrolysis and Synthesis of Water, with 2 Stopcocks and Platinum Electrodes 0 12 6

1633 **Tube Stand,** Universal, to fit any of the above Tubes, Brass Rod, Fittings, and Binding Screws 0 8 0

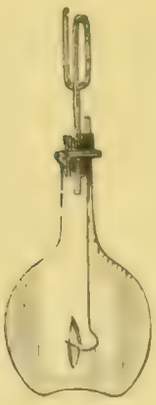
1634 ,, U form, with Stopcock, Platinum Electrodes and Jacket, for Decomposition of Steam 0 8 0

1635 Glass Worm Condenser and Stand, for use with above ... 0 5 6

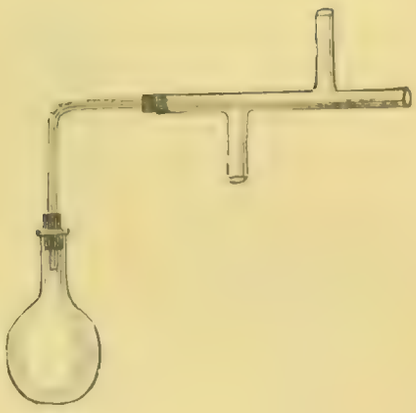
1636 Iron Tripod, with Rod and Clamp and Brass Mounts, for use with No. 1634 ... ... 0 7 6



1640



1643

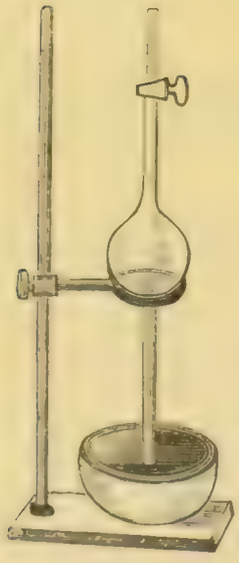


1644

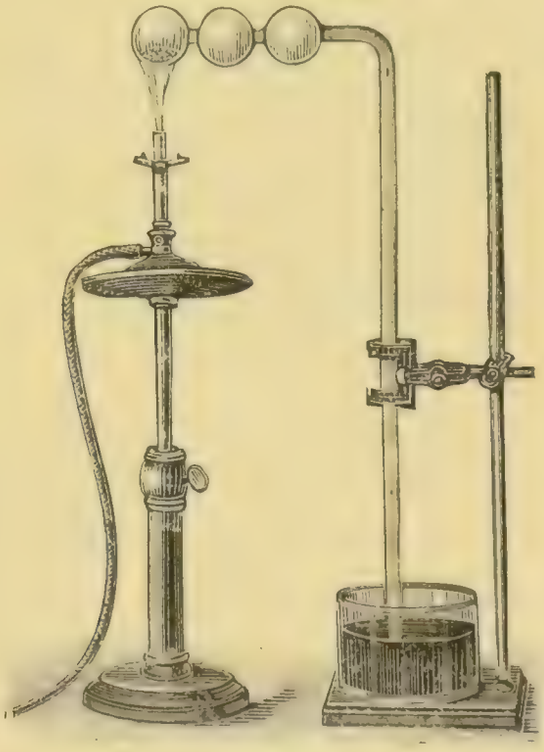
1640 **Hofmann's Apparatus,** to show that in a mixture of Hydrogen and Chlorine in Hydrochloric Acid no condensation takes place £0 5 6

1643 „ to illustrate increase of weight by combustion ... 0 5 0

1644 „ to illustrate that Steam from Water is lighter than Air 0 2 6



1645



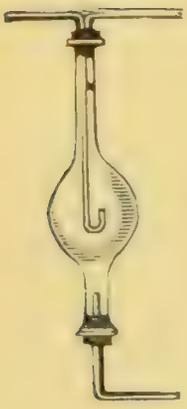
1646A

1645 **Hofmann's Apparatus,** to ascertain relations of Water and Steam, Glass Bulb, with Stopcock 0 4 0

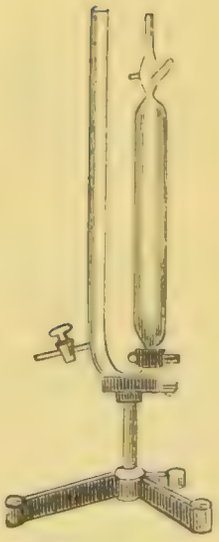
1646 „ Complete with Stand 0 6 0

1646A „ for preparing small quantities of Amorphous Phosphorus 0 2 6

Complete with Stands and Trough 0 11 6



1648



1649



1650



1650A

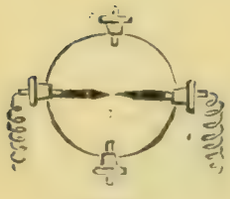
1648 **Hofmann's Apparatus,** to illustrate the combustion of one Gas in another £0 3 6

1649 ,, to illustrate the manufacture of Sulphuric Acid, with 2 Stopcocks 0 9 0

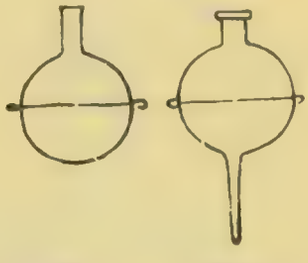
Stand for ditto ... ... extra 0 7 6

1650 ,, to illustrate the maximum density of Water ... 0 12 0

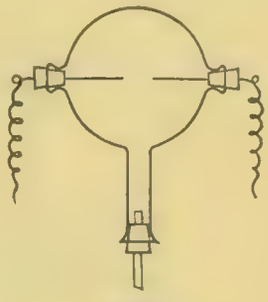
1650A ,, to illustrate combination of Copper with Chlorine, as described in Roscoe and Schorlemmer 0 6 0



1637



1651 1652



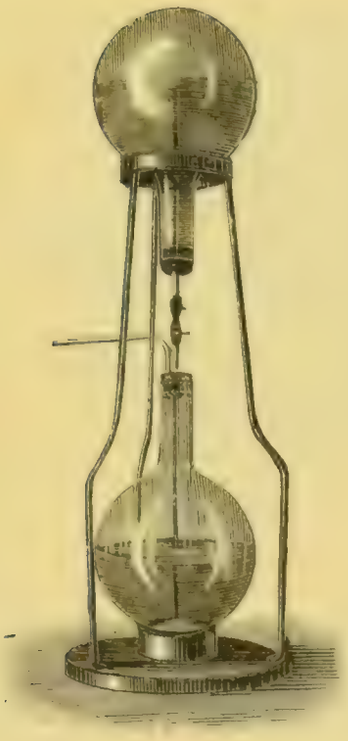
1652A

1637 **Bulb,** with 4 Necks, for preparing Acetyline from Hydrogen and Carbon, 16 oz. capacity, with Carbon Electrodes ... £0 5 6

1651 **Flask,** with Platinum Electrodes, for Decomposition of Steam by Electricity 0 3 0

1652 ,, ,, with Quill 0 3 6

1652A ,, with 3 Necks and Electrodes, to show the combustion of Oxygen and Nitrogen by Electricity 0 3 6



1652B



1652C

1652B **Apparatus,** to illustrate solubility of Hydrochloric Acid Gas with Ammonia Gas, complete £0 15 0

1652C ,, to illustrate diffusion 0 1 9

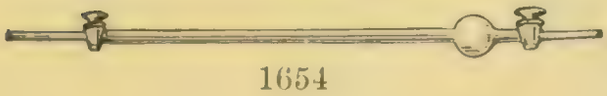
Stand for same 0 6 6



1653



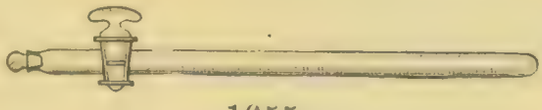
1653A



1654



1655



1655A

1653 **Tube,** with 2 Stopcocks and Platinum Electrodes, to show that Hydrogen and Chlorine combine without alteration of volume £0 7 6

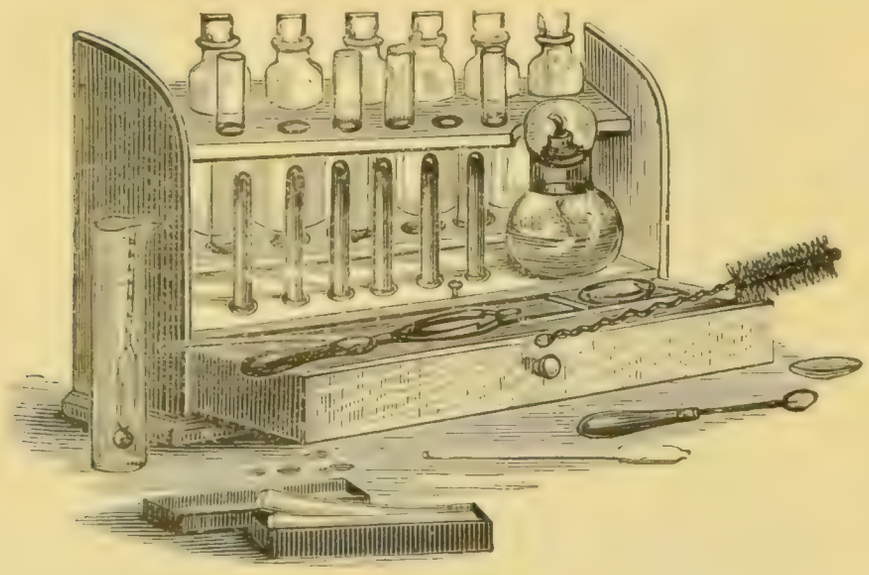
1653A ,, with Stopcock and Stoppered at both ends 0 8 6

1654 ,, with Bulb and 2 Stopcocks 0 5 6

1655 ,, with 1 Bulb and Stopcock and Platinum Electrodes ... 0 7 0

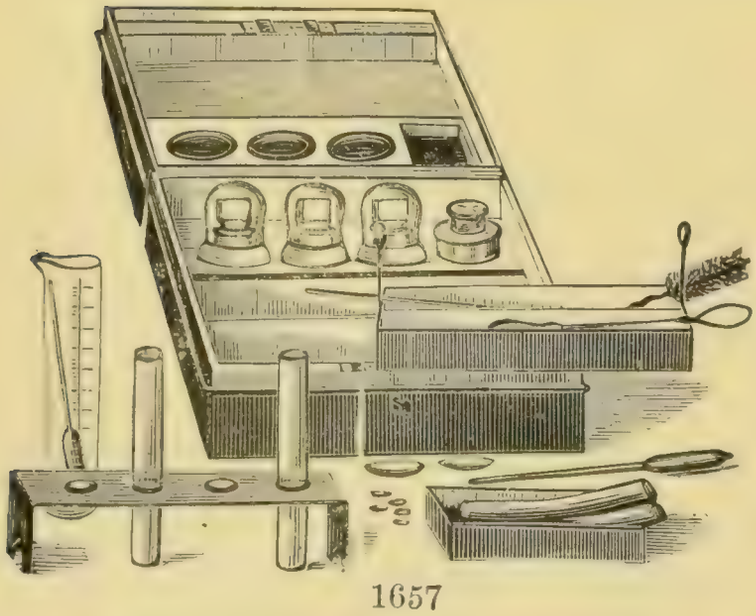
1655A ,, with Stopper at one end and Stopcock, to show that 3 volumes of Hydrogen combine with 1 volume of Nitrogen to form Ammonia 0 9 0

Tall Glass Cylinder on Foot, for use with above ... 0 6 0



1656

1656 **Urinometer,** Set of Apparatus for the use of Medical Officers and Hospitals. Consisting of Mahogany Stand, Polished, with Drawer, and Draining Pegs for Test Tubes; 6 Narrow-Mouthed Stoppered Bottles, 3 oz. Capacity, Spirit Lamp, Urinometer in Case, with Graduated Immersion Tube, 1 doz. Test Tubes, Test Tube Brush, Test Tube Holder, 4 Books Test Paper in Japanned Box, Pipette, 1 doz. Watch Glasses, Watch Glass Holder, Glass Stirring Rod, Microscopic Slides and Circles, complete ... £1 5 0



1657



1658



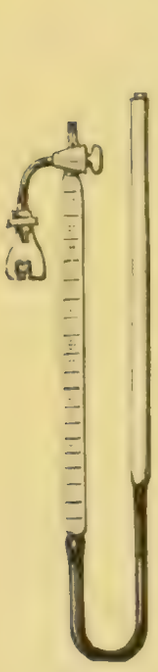
1659

1657 **Urinometer,** Set of Apparatus for Travelling. In stout Japanned Tin Case, with Lock and Key, and Moveable Tray. Dimensions, 8 in. × 6 in. × 3¼ in. Consisting of 3 Capped and Stoppered Bottles, about 1½ oz. capacity, accurately ground, Brass Spirit Lamp with Screw Top, Portable Japanned Tin Test Tube Holder, Urinometer in Case, with Graduated Immersion Tube, 6 Test Tubes, Test Tube Holder, Test Tube Brush, Pipette, 6 Watch Glasses, Glass Stirring Rod, 4 Books Test Paper in Japanned Tin Box, Microscopic Slides and Circles, and Thermometer Graduated on Stem, complete £1 10 0

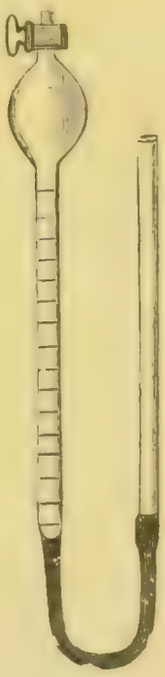
1658 **Urinometer Test Tube,** Thin, for Heating, graduated to 15 c.c. in single divisions, as recommended by Dr. Veale, for detection of Albumen £0 1 0

(*See "British Medical Journal," May 10th*, 1884.)

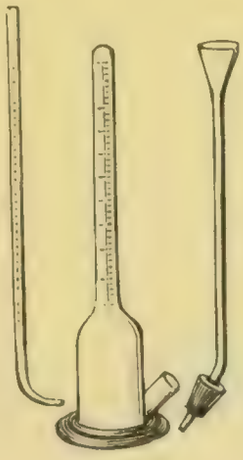
1659 **Urinometer Test Tube,** Stout, Graduated, as recommended by Esbach, in 7 divisions, representing grammes per litre of Albumen 0 2 6



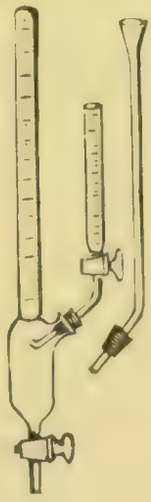
1660



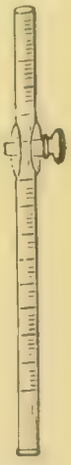
1661



1662



1663



1664

1660 **Lunge Ureometer,** for estimation of Urine by Hypobromide Sodium £0 9 0

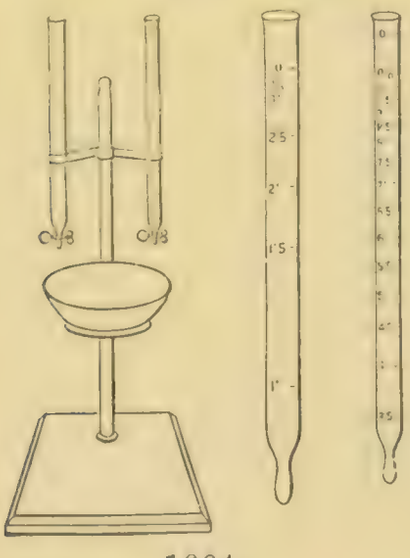
1660A .. ,, with patent Stopcock 0 13 0

1661 .. ,, Improved form... ... ... 0 10 0

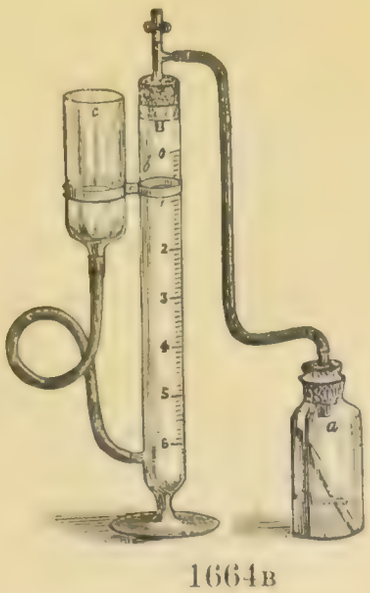
1662 **Greene's** ,, for estimation of Nitrogen by Hypobromide Sodium 0 6 0

1663 **Anderlini's** ,, Ditto 0 12 0

1664 **Yvon's Urinometer** 0 7 0



1664A



1664B

1664A **Gerrard's Glycosometer (Patent)**, for estimation of Sugar in Urine with ease and accuracy in a few minutes, no calculation needed, reads per cents. or grains per oz., complete with Tubes and Directions £0 17 6

Burettes only ... ... per pair 0 12 6

Fehling's Solution in Separate Bottles ... per lb. 0 4 0

, ,, ,, ... per ½ lb. 0 2 3

1664B **Gerrard's Ureometer**, for the estimation of Urea, with directions for use 0 10 6

1664C **Russell & West's Ureometer** 0 8 6

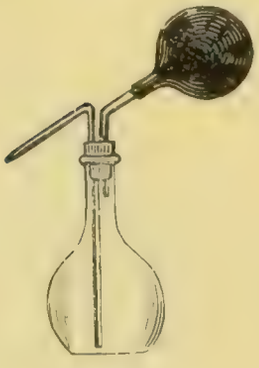
1668 **Vulcanized Rubber or Caoutchouc Sheet**, about 9 in. wide ... ... per oz. 0 0 10

WASHING FLASKS.

Or Water Bottles for Washing Precipitates.



1669



1670



1671



1671A



1672

1669 **Washing Flask**, Gmelin's, fitted with bent Tubes and Rubber Cork, complete—

Capacity	16	20	32	40 ozs.
	1/3	1/4	1/7	1/9 each

1670 **Washing Flask**, Gmelin's, with India Rubber Cork and Blowing Ball—

Capacity	16	24	32	48 ozs.
	2/9	3/	3/2	3/6 each

1671 **India Rubber Blowing Balls**, Best Quality, with Valve ... £0 1 6

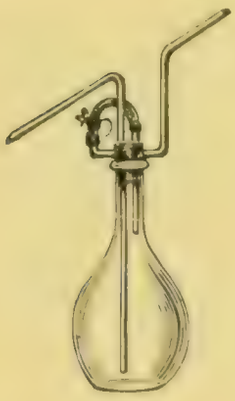
1671A ,, ,, ,, Double 1/3, 1/6 & 0 2 6

1672 **Washing Flask**, Berzelius', 20 oz. capacity, fitted with bent Tubes and Cork, complete 0 1 6

32 oz. ,, ,, 0 1 9

48 oz. ,, ,, 0 2 0


1673


1675


1675A


1684

1673 **Washing Flask,** fitted with Wood Handle and Rubber Cork, for boiling water—

20	30 ozs.
2/4	2/8 each

1675 **Washing Flask,** with Rubber Cork, arranged to prevent the fumes from entering the mouth—

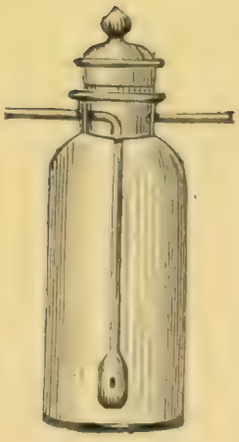
20	30	40 ozs.
2/6	3/	3/6 each

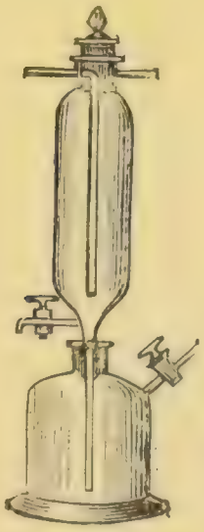
1675A Another form—

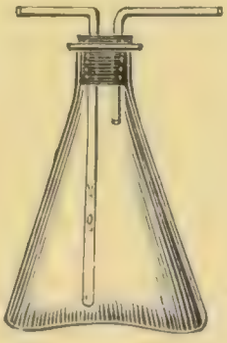
20	30	40 ozs.
2/9	3/3	3/9 each

1684 **Washing Flask,** with Tubes ground into neck—

250	500	750	1000 c.c.
2/6	3/	3/6	4/


1676


1677


1678


1679

1676 **Washing Bottle, Gas, or Absorption Apparatus,** with two Tubes, fused into neck of Bottle ; upper part of Stopper can be removed for examination of contents without disarranging the connections—

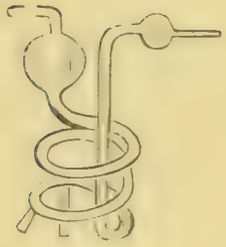
Capacity 125	250	500	1000 c.c.
4/6	5/	6/6	9/6 each

1677 **Washing Bottle, Gas, or Absorption Apparatus,** upper Cylinder with Stopcock, Gas leading Tubes fused into neck and ground into neck of lower Chamber; the Cylinder can be filled with Pumice or pieces of Glass, and the liquid driven by pressure out of lower Vessel into upper Cylinder, Capacity 150 c.c. ... £0 15 0

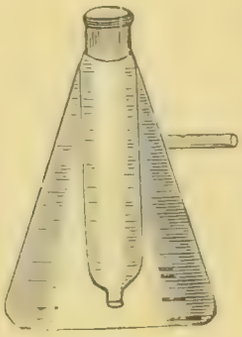
1677A ,, ,, ,, without Stopcocks 0 10 0

1678 **Washing Bottle, Gas, or Absorption Flask,** with India Rubber Stopper and Valve to prevent the rising of liquid, used instead of Muencke's Flask... .. ... 0 3 0

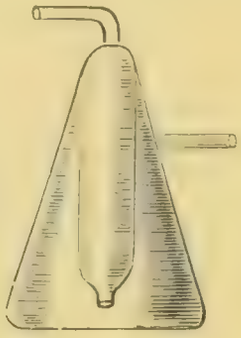
1679 **Washing Bottle, Gas, or Absorption Tube,** Dr. Wilfarth's, fitted with India Rubber Stopper and Tubes with Valve ... 0 2 6



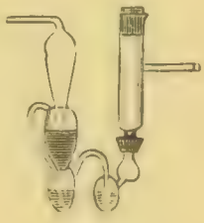
1679A



1679B



1679C



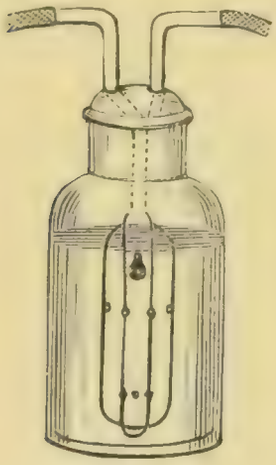
1679D

1679A **Absorption Apparatus,** Winkler's—

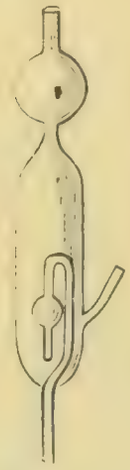
Small	Medium	Large
1/6	2/	5/ each

1679B & C ,, **Flask,** Habermann's ... ... each £0 1 6

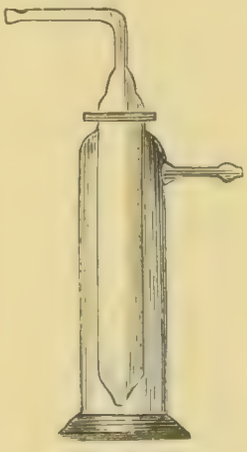
1679D ,, **Apparatus,** for Carbolic Acid, Strohmer's ,, 0 3 0



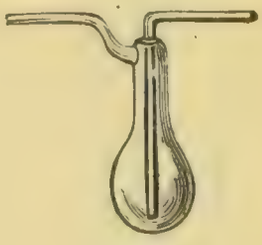
1680



1681



1682



1683

1680 **Allihn's Gas Washing Flask,** improved form—

Capacity 250	500	1000 c.c.
4/	4/6	5/6 each

1681 **Kjeldahl's Gas Washing Apparatus** £0 3 0

1682 **Habermann's** ditto, about 250 c.c. capacity 0 2 6

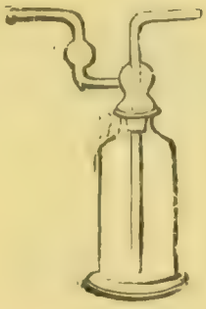
1683 **Cloez'** ditto, about 100 ,, ,, ... 0 1 3



1684A



1684B



1685



1686

1684A **Vollhardt's Absorption Flask,** Improved £0 1 6

1684B **Voigt's Absorption Apparatus,** for Sulphuric Acid ... 0 15 0

1685 **Washing Bottle,** for Gas, "Drechsel's" with Inlet and Outlet, Tube on Stopper, accurately ground in—

Capacity	250	500	750	1000 c.c.
	2/3	3/	3/6	4/ each

1686 **Washing Bottle,** Dr. Muencke's improved, 200 c.c. ... 0 3 6

,, ,, with valve, 250 c.c. 0 4 0



1687



1687C



1688



1689



1690

1687 **Watch Glasses,** thin White Glass, with ground Edge—

1½	1¾	2	2¼	2½	3	3½	4	4½	5	6	7	8 in. diameter
8d.	9d.	1/	1/3	1/6	2/	2/6	3/6	5/	7/	8/6	10/	13/ per doz.

1687A **Watch Glasses,** with Flat Bottoms and Rounded Edges, 2 in. diameter ... ... per doz. £0 1 6

1687B ,, ,, with Flat Bottoms and Ground Edges—

Diameter 2	2½ in.
2/	2/6 per doz.

1687C ,, ,, with Handle, all Glass, 2 in. diameter, per doz. 0 3 6

1688 **Watch Glass Holder,** for the hand, Brass Wire in Wood Handle 0 0 5

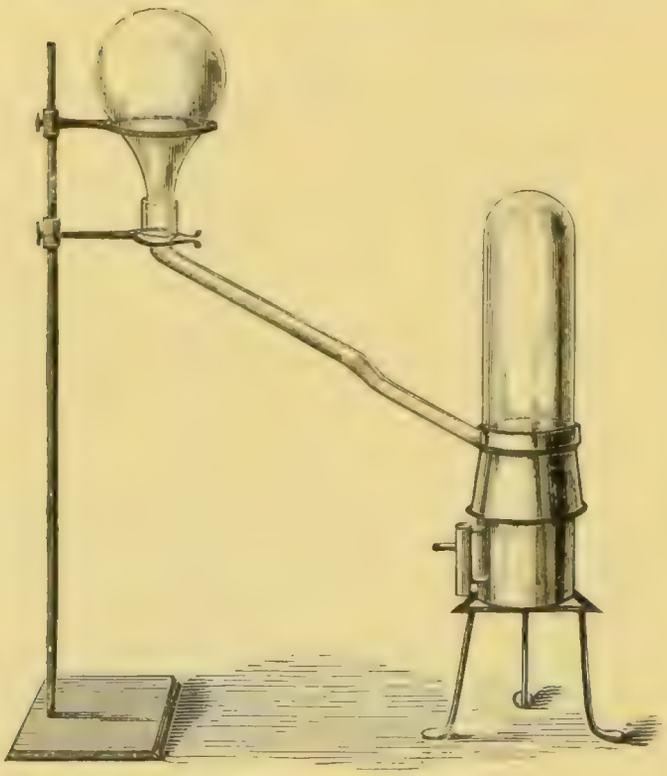
1689 **Watch Glasses,** Ground to fit accurately, with Binders for Weighing Filters, &c., complete, 2 in. diam., per pair 0 0 8

,, ,, 2½ ,, ,, 0 0 10

1690 **Watch Glass Clip,** Stout Brass Wire ... each 0 0 3

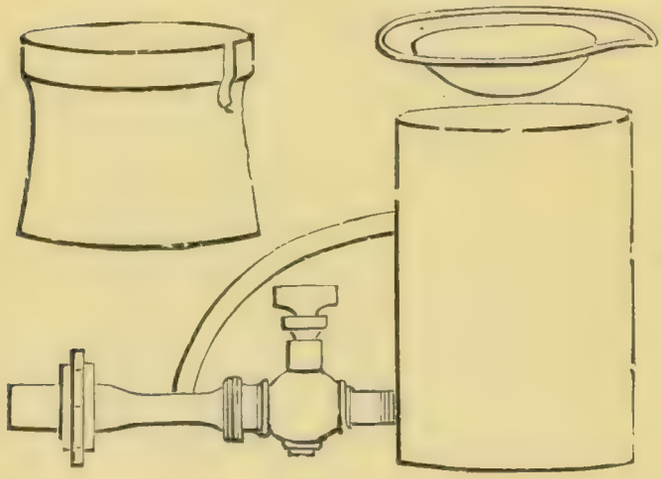
1690A ,, ,, Aluminium Wire ... ,, 0 0 4

WATER ANALYSIS.

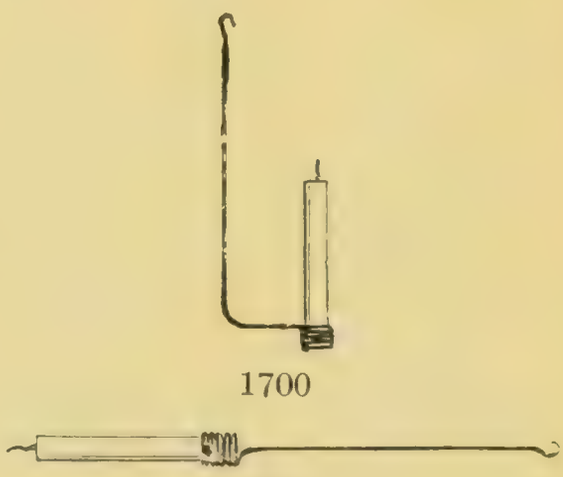


1691

1691	**Water Analysis Apparatus,** Bischof's, Copper Bath, on Iron Stand, complete... ...	£1	2	6
1692	„ „ „ Glass Retort and Shade only	0	5	6
1693	**Frankland's Water Analysis Apparatus,** complete ...	10	10	0
1693A	**Water Analysis Set,** as arranged by Dr. Allan, for D.P.H. Examinations, complete in Fitted Box	2	0	0



1694



1700

1701

1694	**Frankland's Copper Support, Basin and Water Bath,** with Stopcock	£1	0	0
1695	**Wanklyn's Apparatus,** for Analysis of Water, Tea, Coffee and Milk. *(See Special List.)*			

Water Baths. *(See Drying Apparatus, pages* 72—79.)

Weights. *(See Balances and Weights, pages* 2—27.)

1696 **Wire Gauze,** Iron, fine, Squares—

4×4	6×6	9×9	12×12 in.
2d.	3d.	7d.	10d. each

1697 „ Iron, Coarse, in Squares—

6×6	9×9	12×12 in.
3d.	6d	9d each

1698 „ Stout Brass Squares 6×6 in. ... each £0 0 8

1699 „ Copper, fine, for Combustion Tube, 12×12 in., per foot 0 2 0

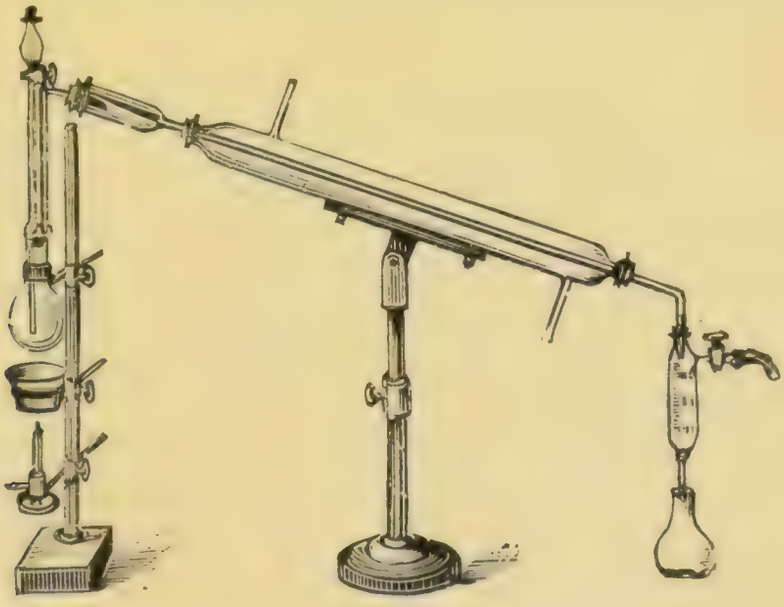
Extra Fine Mesh 0 2 6

1005 **Asbestos Millboard,** for use on hot plate over Bunsen Burner, &c., instead of Wire Gauze, Sand Dishes, &c., $\frac{1}{8}$ in. thick—

4×4	5×5	6×6	9×9	12×12 in.
2d.	3d.	4d.	6d.	9d. each

1700 & 1701 **Wire Taper Holder,** with Taper, either form, each 0 0 5

1702 **Nickel Gauze,** medium Mesh ... ... per oz. 0 1 0



1703

1703 **Wolf's Apparatus,** to estimate Acetic Acid in Wine, Glass

Parts only £0 18 0

Complete with Stands and Burner 1 10 0

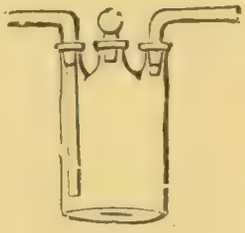
WOULFFE'S BOTTLES.



1704



1705



1706

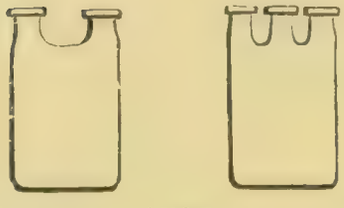
1704, 1705 **Woulffe's Bottles,** Best White Glass—

Capacity	4	8	12	16	20	24	32 ozs.
2 necks	8d.	11d.	1/	1/1	1/2	1/3	1/4 each
3 necks	10d.	1/2	1/3	1/4	1/6	1/8	1/10 each

Capacity	48	64	100	130	160	220	300 ozs.
2 necks	1/8	2	2/6	3/	4/	5/6	7/6 each
3 necks	2/	2/6	3/	4	5/	6/	8/6 each

1706 **Woulffe's Bottles,** with 3 necks, Stoppered, with Inlet and Outlet; Tube accurately ground to fit—

Capacity	6	8	12	16	20	24	32	48	64	80	100 ozs.
	2/3	3/	3/3	3/6	3/9	4/	4/6	5/	6/6	7/6	8/6 each



1707



1708



1709

1707 **Woulffe's Bottles,** Light Bohemian Glass, with 2 or 3 necks—

Capacity 2 ozs.	...	...	£0 0 10
,, 4 ,,	...	...	0 1 3

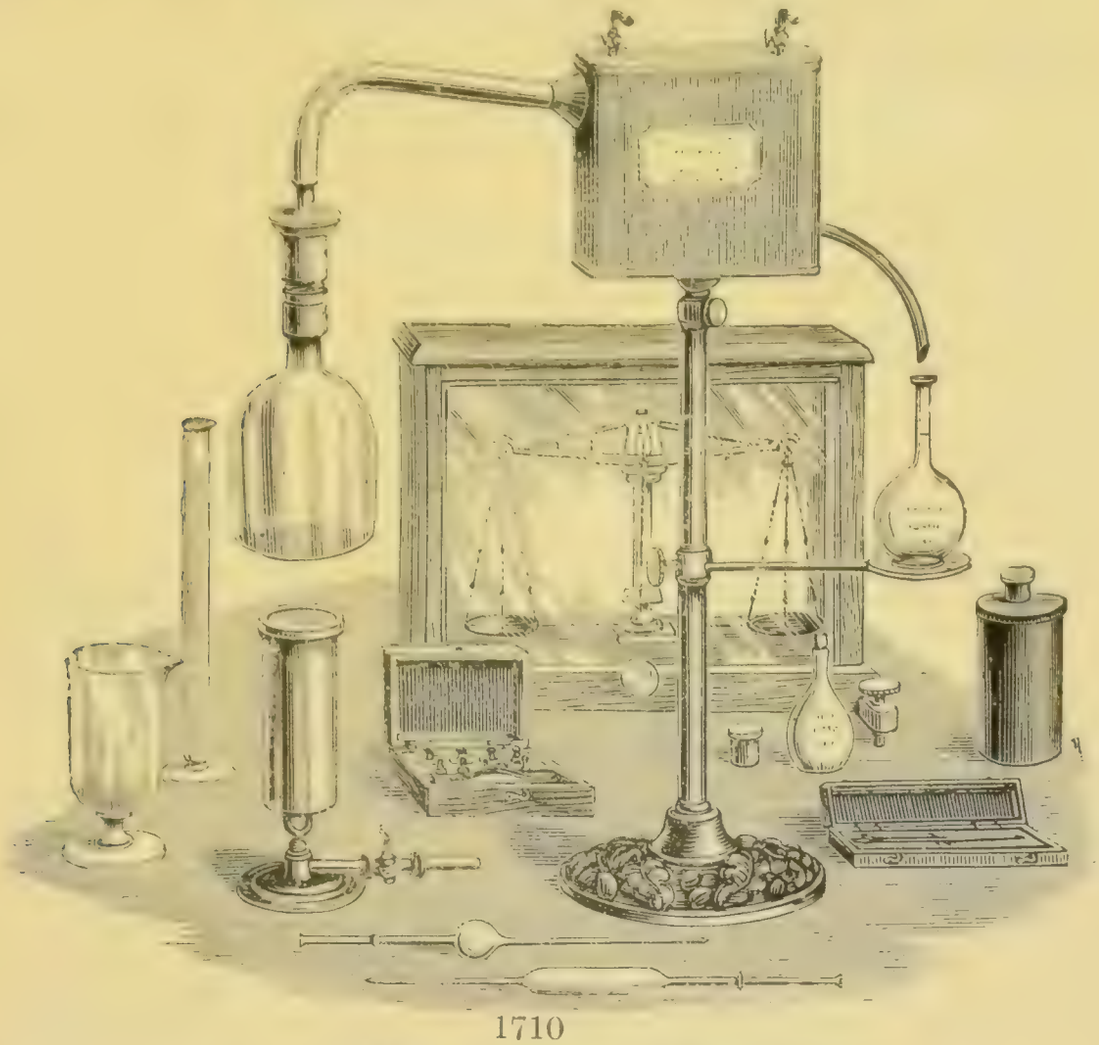
1708 ,, Bohemian Glass, with Round Bottoms, thin, for boiling—Capacity 45 ozs., 2 necks 0 3 0

1709 ,, ,, 64 ,, 3 ,, 0 4 6

REVENUE STANDARD STILL.

For ascertaining the Strength of Wines, Liqueurs, and Original Gravities of Beer.

As supplied to the Laboratories of Her Majesty's Boards of Inland Revenue and Customs, and the Principal Brewers and Wine Merchants in the United Kingdom, Colonies, &c.



1710

THE BEER SET.

The Apparatus required for conducting the process described in the directions for determining the Original Gravities of Beers, has been arranged by Townson & Mercer, with the approval of the Principal of the Inland Revenue Laboratory, Somerset House, and consists of the undermentioned :—

Revenue Standard Still and Distilling Flask	£3	3	0
6 Distilling Flasks, with Brass Mounts to fit on Still ... at 2	0	12	0
1 doz. Elastic Washers	0	1	6
6 Receivers marked in neck at 1,600 grains ... ... at 1 4	0	8	0
Argand Gas or Copper Spirit Lamp, with Sliding Rod	0	10	6
6 Cylindrical Test Glasses, at 10d.	0	5	0
1 „ Pipette	0	0	6
1 Bulb „	0	0	4
Chemical Balance in Glass Case, with arrangement for steadying Scale Pans, with Rider Apparatus	6	10	0
Box Chemical Weights, 1,000 grains to $\frac{1}{100}$th	1	10	0
1 each Graduated Measure, 500 and 1,000 grains, divided into 100 div.	0	3	6
Specific Gravity Bottle, 1,000 grains, accurate to $\frac{1}{50}$th of a grain, with Counterpoise in case ...	£0	15	0
Box of Test Papers, assorted ...	0	1	6
Specific Gravity Thermometer, Ivory Scale, with bare bulb in leather case	0	7	6
Pint bottle of Test Ammonia ...	0	2	6
12 ft. Vulcanized Rubber Tube ...	0	5	0
Book of Directions, with Tables of Original Gravities	0	1	6
2 Glass Saccharometers, graduated with single degrees for taking the Specific Gravity of Beers, 1·040 to 1·080, and 1·080 to 1·125	0	5	0
1 Immersion Tube	0	1	0

Complete Set, packed in Strong Case, £15 10s. 0d.

THE WINE SET.

1711	Revenue Standard Still and Distilling Flask		£3	10	0
6	extra Distilling Flasks, with Mounts to fit the Still	at 2	0	12	0
1	dozen Elastic Washers		0	1	6
2	Standard Measure Glasses, Gauged... ...	at 1/4	0	2	8
1	Pipette or Dropping Tube		0	0	6
1	Water Bottle with Tubes, for washing, or making up the bulk of the Distilled Spirit		0	1	3
2	Trial Glasses, for Sikes' Hydrometer, to allow the trial of a smaller quantity of Spirit than the ordinary ones, at 1/2		0	2	4
1	Argand Gas Lamp (or Copper Spirit Lamp)		0	10	6
12	ft. Flexible Tube for connecting the water or gas supply ...		0	5	0
1	Thermometer in Leather Case		0	7	6
	Sikes' Hydrometer, with Weights and Thermometer, complete, in Mahogany Case, and Book of Tables ...		2	10	0
	Or Keene's Wine Hydrometer, requiring no Weight ...		2	15	0
	Thermometer in White Metal Case...		0	15	0

Complete Set, packed in Strong Case, £9 5s. or £9 10s.

DIRECTIONS FOR USE.

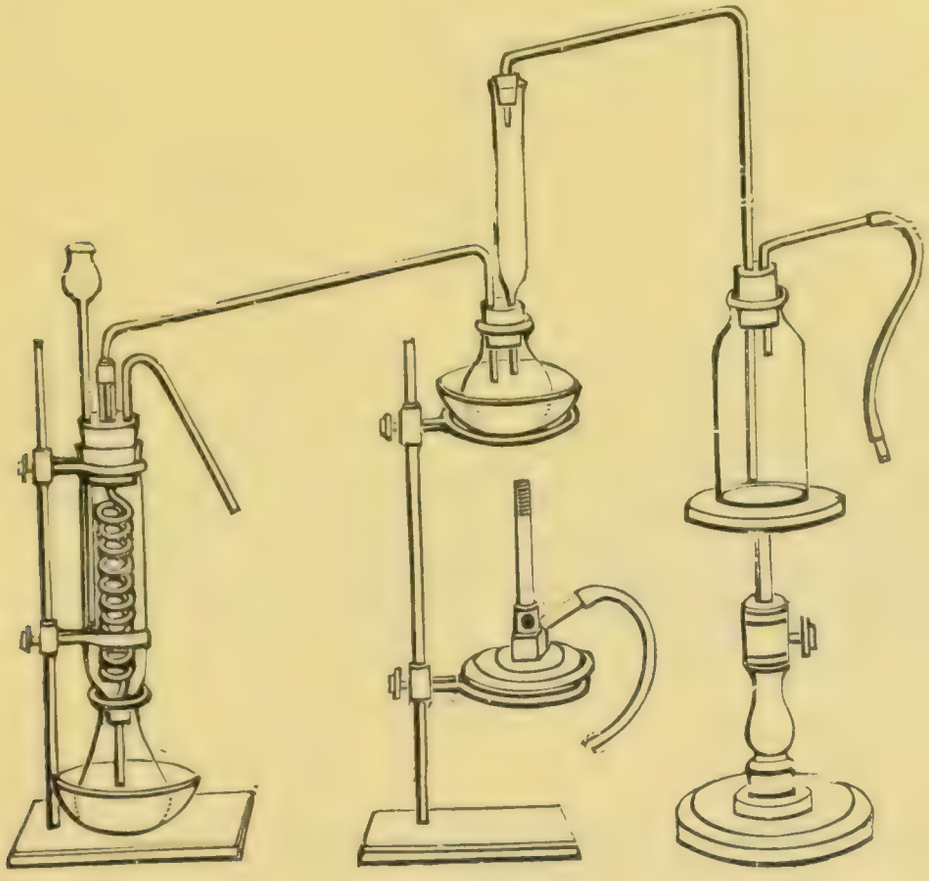
PUT THE STILL IN WORKING ORDER by attaching the water supply, which may be a cistern or cask placed three or four feet above the top of the condenser; the connection is to be made by flexible tube from the cock in the cistern to the tube marked on the condenser, the outflow of water being conducted from the tube (O) into a pail; the quantity used may be regulated by the cock in the cistern; the water having been found to flow through the condenser in a continuous stream, the gas lamp should be connected also by means of flexible tube with a gas pipe, and lighted on the top of the gauze; where gas is not obtainable, an Argand spirit lamp will be supplied.

TRIAL OF A SAMPLE.—Fill the standard measure glass with wine up to the highest mark, adjusting the exact quantity by using the pipette or dropping tube; pour the measured wine into the still flask, rinsing out the measure with a little water, which must be added to the wine; the measure being quite clean, is placed upon the bracket and adjusted to receive the distilled wine spirit; the still flask is then to be screwed tightly to the condenser, interposing an elastic washer between the top of the flask and the metal shoulder on the still pipe; put the lamp under the still flask, at first moderately burning, afterwards increasing the flame; in a few minutes the wine will boil, and the vapourised spirit will begin to condense, falling into the measure. Repeated experiments have proved that with weak wines, such as contain under 26 per cent. of proof spirit, it is only necessary to distil over one-half the bulk; but stronger wines, containing much extractive, require the distillation to be continued until two-thirds are distilled; the standard measure is therefore graduated at two-thirds as well as one-half. When the required point on the measure is obtained, the original measure of the wine (to the highest mark) is to be made up with water, then poured into the trial glass, stirred well, so that the spirit and water may be perfectly mixed, with the thermometer the temperature observed, and the strength taken by Sikes' hydrometer according to the usual tables.

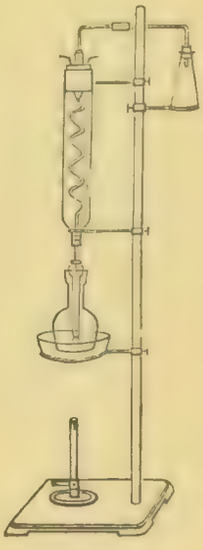
To ensure extreme accuracy, it is necessary that the temperature of the wine before distillation, and the spirit and water before taking the strength by the hydrometer, should be the same, that the two bulks may be identical.

SET OF APPARATUS FOR THE ESTIMATION OF SULPHUR IN SPENT OXIDE.

1712 *Arranged by* Mr. Stephenson, *Gas Purification Company, London, and used by most of the Gas Companies in the United Kingdom.*



1712



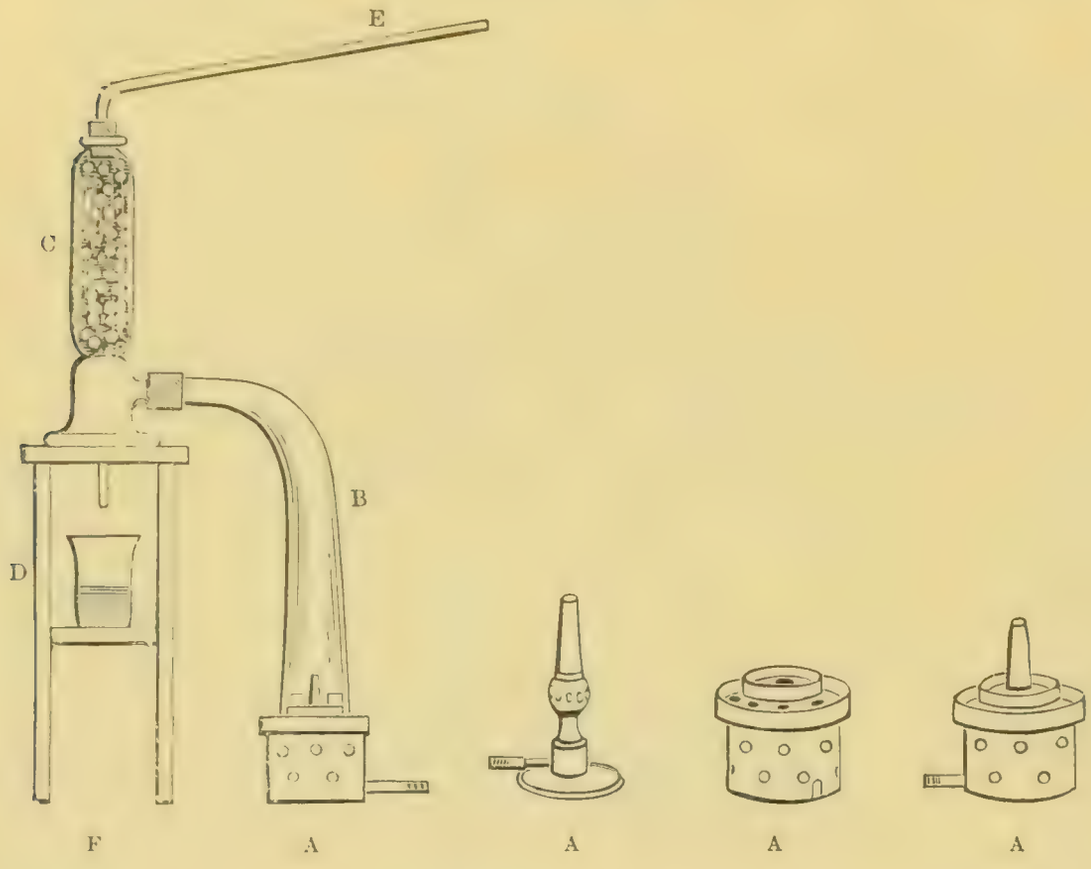
1712A

Glass Condenser with Worm, fitted with Thistle Funnel, Bent Tube, and Syphon.
Conical Flask.
2 Deep Tin Sand Dishes.
2 Retort Stands, 17 in. Rod with 2 Rings.
Bunsen's Gas Burner.
Flask fitted with Sulphur Tube and Bent Tube.
2 ft. Vulcanized Rubber Tube.
Bottle with Wide Mouth and Cork fitted with Bent Tube and Outlet Tube.
Rising Table.

Packed in Case, 21/.

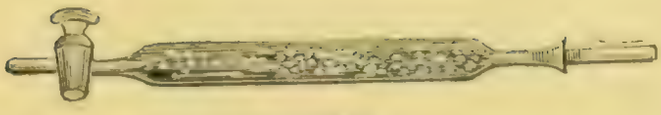
Sulphur Tubes	each	£0	0 6
1712A **Bales' Set,** for the Estimation of Sulphur in Spent Oxide, packed in Box, complete with Instructions		0	17 6
Extra Stoppered Flasks for above ...	each	0	2 6

APPARATUS ADOPTED BY THE METROPOLITAN GAS REFEREES FOR TESTING THE PURITY, &c., OF COAL GAS.

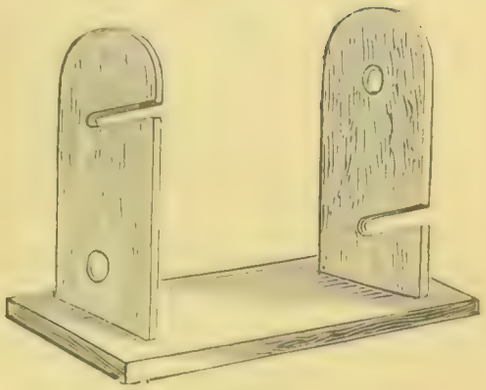


SULPHUR COMPOUNDS.

1713	Bunsen's Burner (A) with Steatite Top, on Metal Cylindrical Stand, with holes for admission of air and Circular Channel to receive Wide end of Trumpet Tube ...	£0	12	6
1714	Trumpet Tube (B)	0	2	0
1715	Vertical Glass Cylinder (C), with hole at bottom for Glass Tube to pass through	0	3	0
1716	Glass Marbles for Cylinder, per 100	0	2	6
1717	Bohemian Glass Beaker for collecting the Condensed Liquid	0	0	8
1718	Condenser Tube, Bent (E)	0	2	6
1719	Wood Table Support, with Shelf (F), for Cylinder and Beaker	0	4	0
1720	Vulcanized Rubber Tube for Gas Burner ... per foot	0	0	5
1721	,, Stout Red, for Sulphur Cylinder and Condenser Tube, 1 in. internal diam. ... ... per foot	0	2	6



1722



1723

FOR AMMONIA.

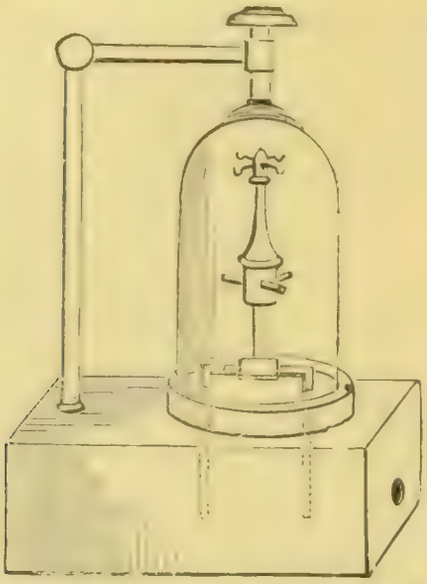
1722	Ammonia Cylinder, filled with Glass Beads, with Stopcock and Stoppered Tube	£0	10	6
1723	Wood Stand for ditto	0	4	0
1724	Burette, 100 septems graduated into 100 divisions, with Clip and Jet...	0	3	3
1725	Burette Stand, with Clamp	0	4	6
1726	Pipette, with mark to deliver 25 septems	0	0	9
	,, ,, 50 ,, ...	0	1	0
1727	Test Sulphuric, 25 septems, will neutralize 1 grain Ammonia per litre	0	4	0
1728	Test Ammonia, 100 septems = 1 grain Ammonia per litre ...	0	4	0

CHEMICALS IN GENERAL USE.

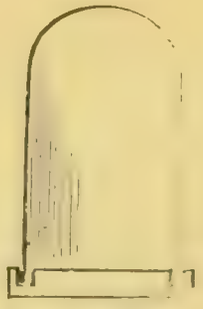
Carbonate Ammonia, in 7 lb. Jars	per lb.	£0	0	6
Hydrochloric Acid, Pure	,,	0	0	5
Barium Chloride ,, ...	,,	0	0	7
Silver Nitrate, Re-cryst.	per oz.	0	3	6
Ammonia Solution, Sp. Gr. ·880	per lb.	0	0	6
Sulphuric Acid, Sp. Gr. 1·840	,,	0	0	5
Hæmatine Tincture	pint	0	4	0
Distilled Water	gallon	0	0	6
Cochineal Tincture	pint	0	6	0
Mercury	(varies) per lb.	0	3	0

For Prices of other Chemicals and Apparatus see General Catalogue.

SULPHURETTED HYDROGEN.



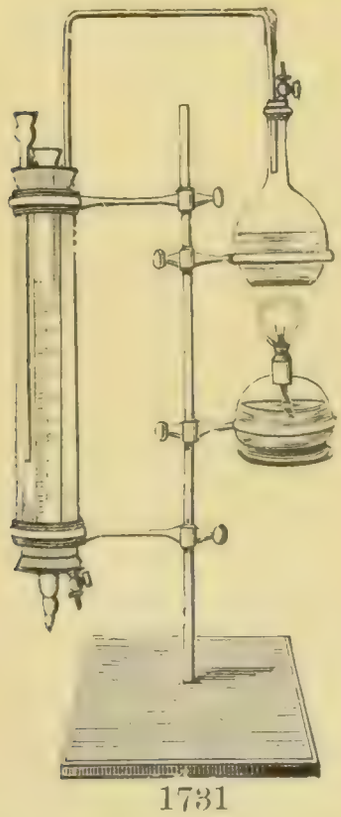
1729



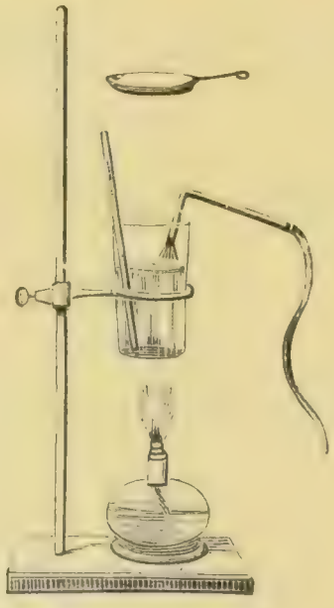
1729 **Apparatus** through which the Gas passes from the Service Pipe, consists of a Glass Shade, Perforated Metal Tube, with connections for inlet and outlet of Gas, and Hook Supports for Test Paper, Earthenware Tray, with Circular Channel to hold Mercury for Glass Shade, Wooden Stand with Rod and Spring Clamp £1 10 0

1730 White Bibulous Paper ... ... per quire 1/ and 0 1 6

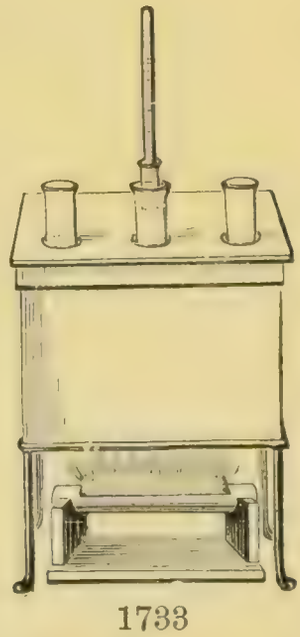
APPARATUS EMPLOYED BY Mr. MacIVOR IN TESTING LUBRICATING OILS.



1731



1732

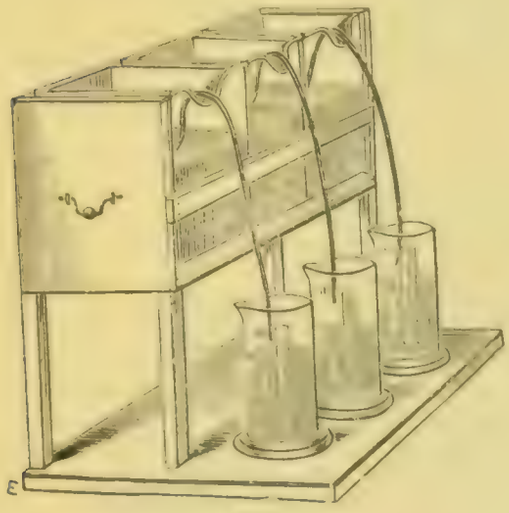


1733

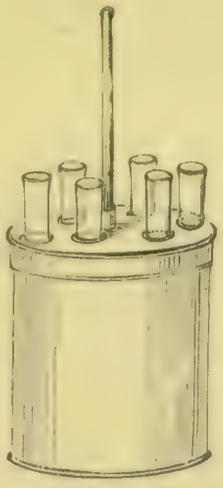
1731 **Viscosity Apparatus,** on Iron Stand, with Brass Rings, Vulcanized Rubber Stoppers, Graduated Tube, &c., with Thermometer, complete £1 10 0

1732 **Flash Point Apparatus,** with Thermometer £0 8 6

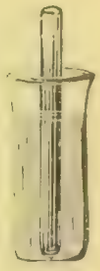
1733 **Specific Heat Apparatus,** Copper Bath on Iron Stand, and long Brass Tube to hold wick and Spirit, on Stand, with Thermometer 0 17 6



1734



1735



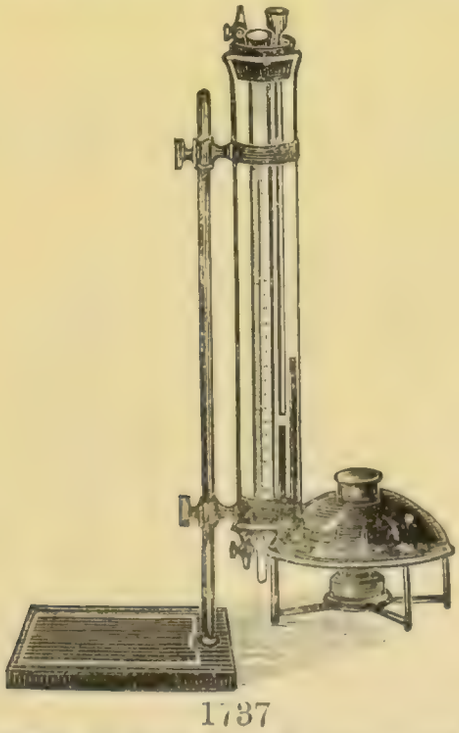
1736

1734 **Capillarity Apparatus.** 3 Glass Vessels, marked; on Mahogany Stand, and 3 Graduated Measures ... £1 0 0

1735 **Solidification Apparatus.** A Glass Vessel for Ice or Freezing Mixture, Japanned Tin Cover with 6 Holes for Test Tubes, and Thermometer 0 7 6

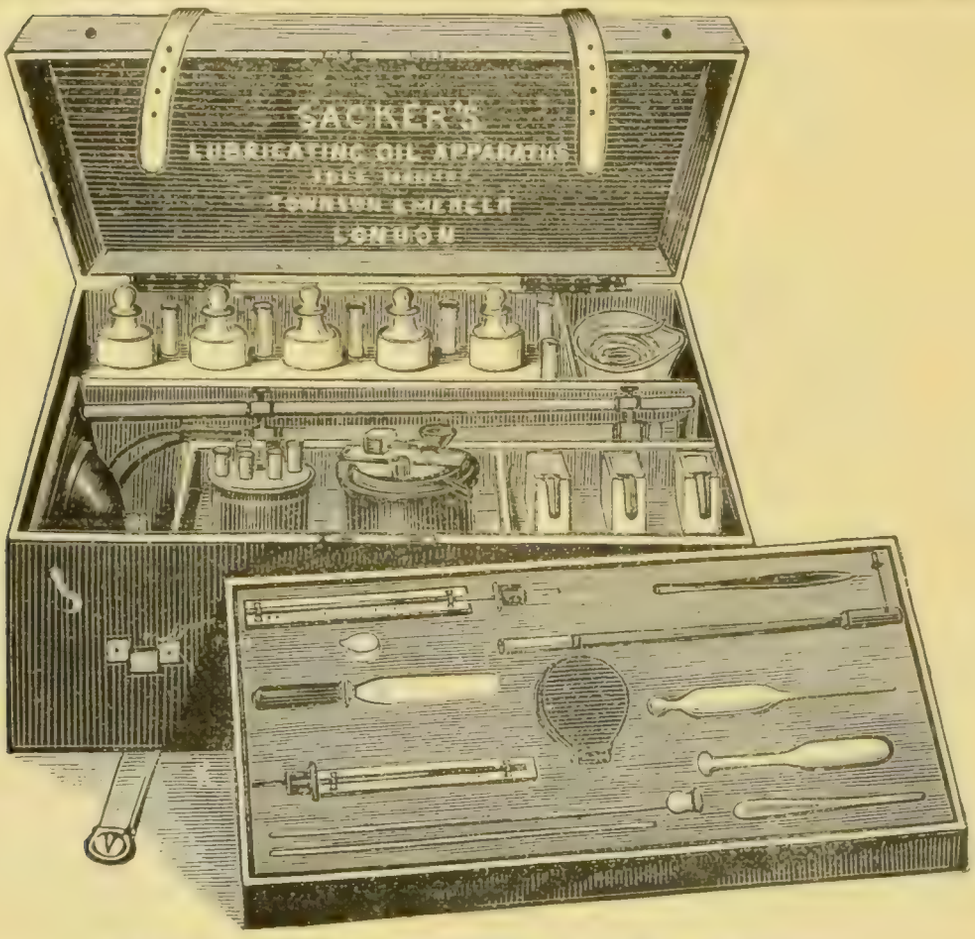
1736 **Metal Oxidation Test** 0 1 0

SACKER'S APPARATUS FOR TESTING LUBRICATING OILS.



1737

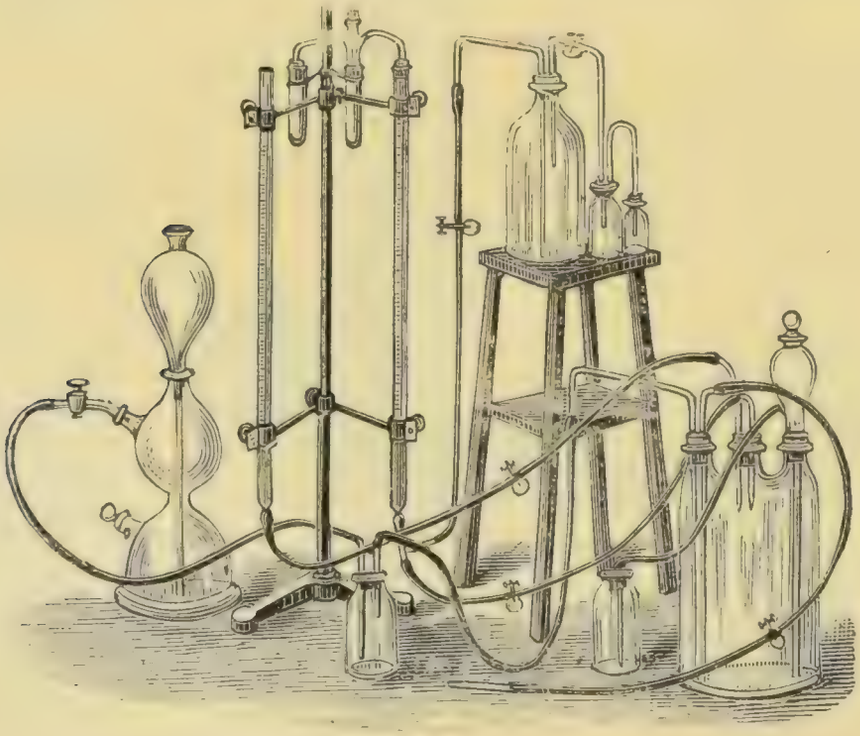
1737 **Viscosity Apparatus,** on Iron Stand, improved by Mr. SACKER, with Brass Rings, Vulcanized Rubber, Stopper, Graduated Tube, Thermometer, Copper Boiler, Spirit Lamp and Tubes for keeping Water in Jacket at an even temperature £1 15 0



1738

SACKER'S TEST CABINET.

1738 Consisting of Viscosity Tubes on Stand with Lamp and Boiler as Fig. 1737. Government Flash Test with 2 Thermometers, Solidification Jar, with Metal Cover and Tubes, Capillarity Stand with 3 Glass Jars and Graduated Measures, 2 Platinum Capsules, Metal Oxidation Test, Hydrometer, Blowpipe with Platinum Jet, Mortar and Pestle, Stoppered Bottles, Chronograph in Morocco Case, &c., fitted in Polished Mahogany Cabinet lined with Cloth, and Leather Straps outside for convenience of portability £18 10 0

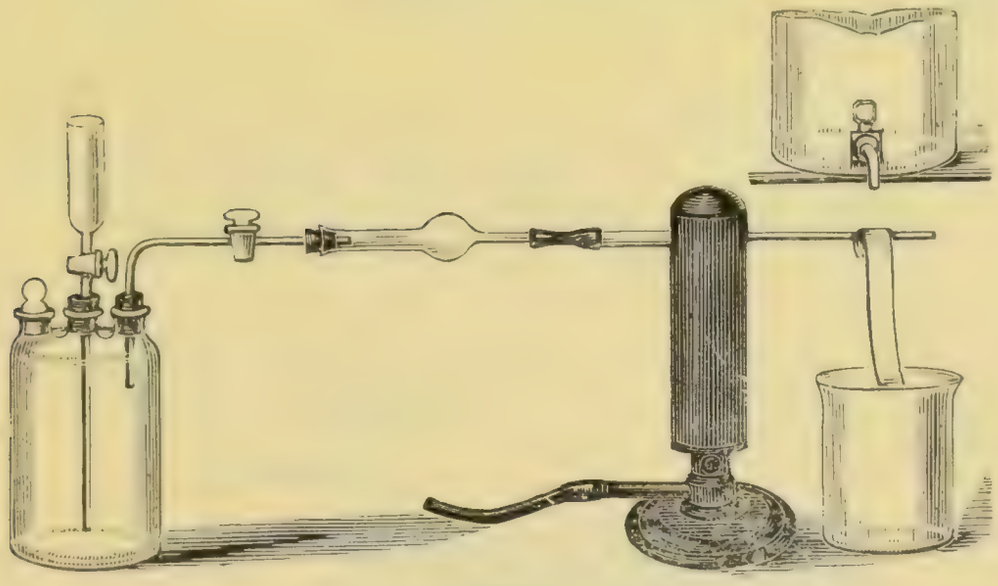


1739

SCHUTZENBERGER'S APPARATUS FOR THE DETERMINATION OF THE DISSOLVED OXYGEN IN WATER.

ARRANGED AND MODIFIED BY DR. DUPRE AND MR. W. J. DIBDIN.

1739 The determination of the degree of Æration of Potable Water has hitherto seldom been made in consequence of the tedious processes involved. The Apparatus designed by Schutzenberger has happily supplied a ready means of making the determination, and in its present modified form it leaves little to be desired, as an examination can now be conducted in a few minutes ... Price £4 4 0

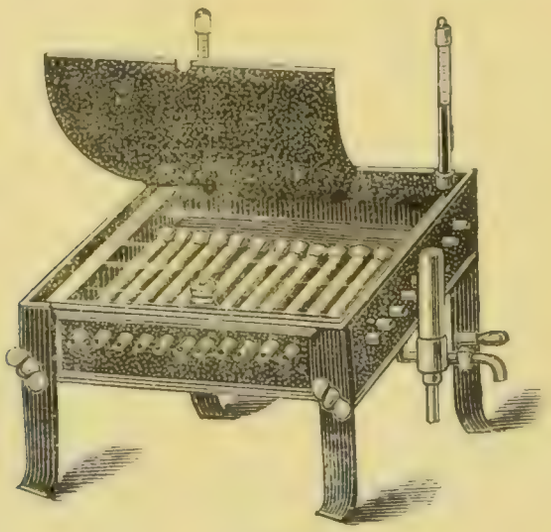


1740

1740 **Reinsch's Arsenic Test Apparatus,** consisting of Woulffe's Bottle, with Cylindrical Funnel and Stopcock, Chloride of Calcium Tube fitted with Glass Stopcock, Bunsen's Burner, Clay Chimney, and Aspirator with Stopcock, as recommended in "Our Domestic Poisons," by Mr. H. Carr ... ... complete £1 0 0

1740A **Reinsch's Test for Arsenic**—8 oz. Hydrochloric Acid, guaranteed pure, ¼ oz. Electro Copper Foil, 8 in. Thin Platinum Wire, 1 Spirit Lamp, 2 Test Tubes, 1 Test Tube Holder, 1 Pair Plyers, 25 Thin Glass Tubes Closed at one end, 3 in. × ¼ in., 1 Piece Thin Sheet Brass 4 in. × 1½ in. ... packed in Box complete 0 8 0

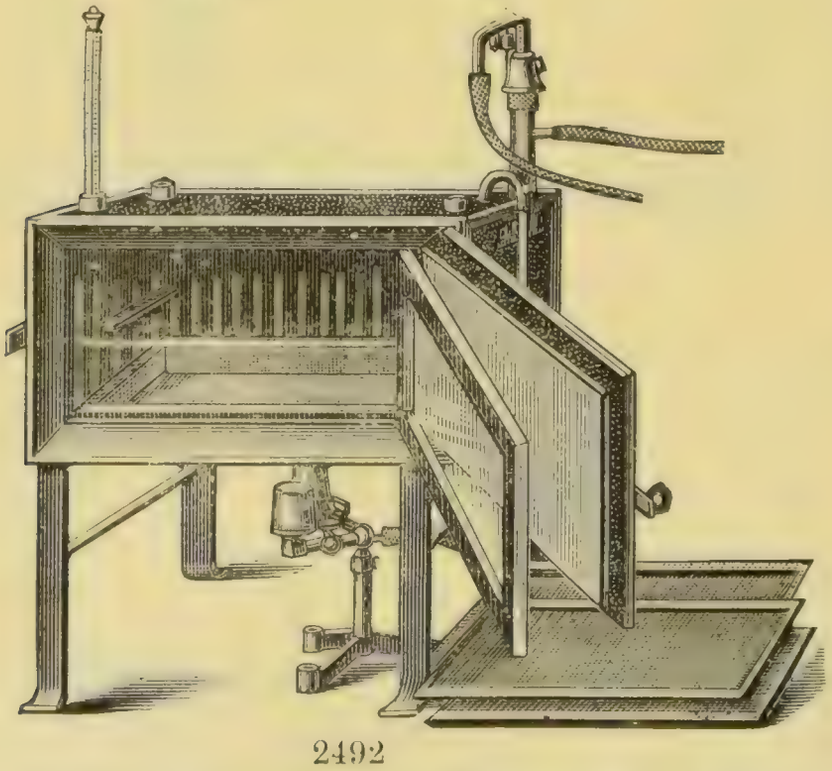
SELECTION OF APPARATUS
USED IN THE CULTIVATION OF BACTERIA.



2491

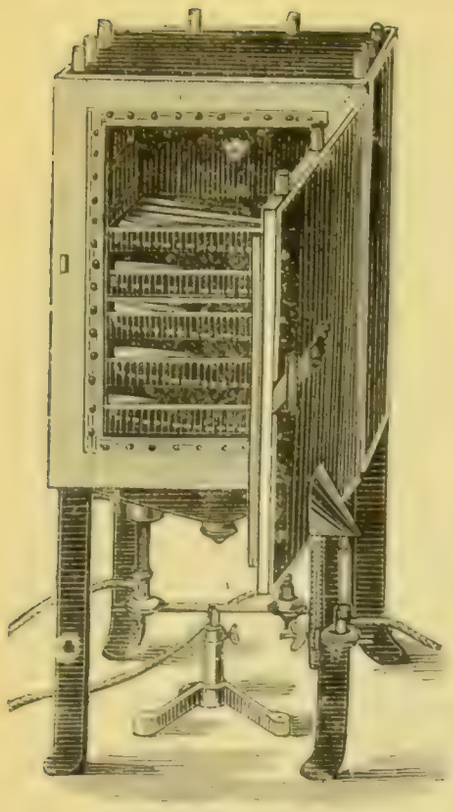
2491 **Serum Inspissator,** Koch's, stout Tin with Double Walls and Glass Cover, covered with thick Felt, Copper Bottom, Brass Mounts, on strong Iron Stand with Sliding arrangement for adjusting to any required angle for

50	100 Test Tubes
£1/11/6	£2/2/



2492

2492 **Serum Inspissator,** Hueppe's, stout Iron, with Glass and Metal Doors, 10 × 10 × 10 in., suitable for 4 Trays, covered with thick Felt and mounted on strong Iron Stand, price without Burner and Trays **£3 15 0**



2493



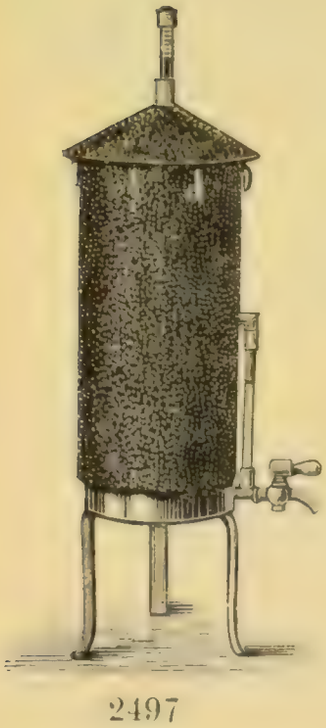


2495

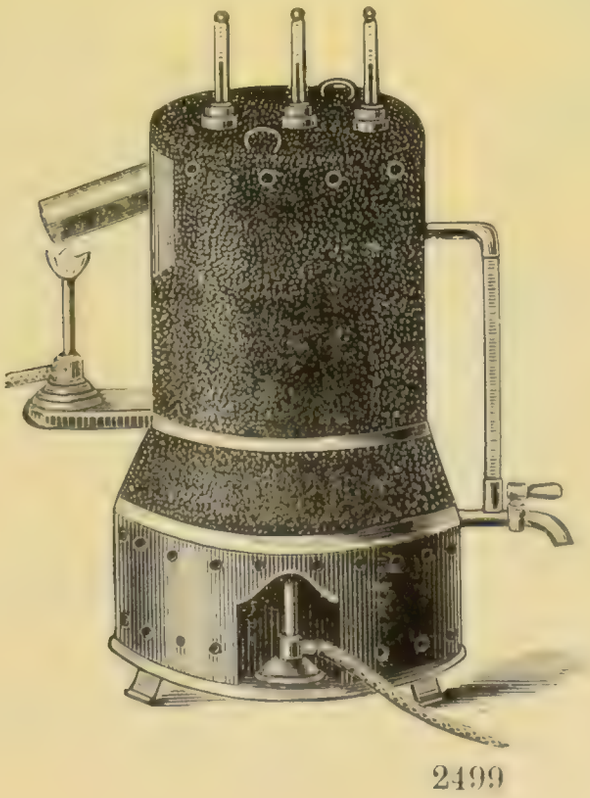
2493 **Serum Inspissator,** perpendicular form, Stout Iron, Double Jacketed, with Conical Bottom 11 × 8 × 8 in. inside, covered with thick Felt, mounted on Iron Stand, complete with 2 Wire Baskets, 5 Trays, and Gas Burner ... £7 15 0

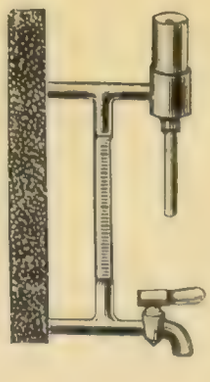
2495 **Serum Steriliser,** Cylindrical Form, stout Tin, with Gauge and Stopcock, suitable for rapid production of a large quantity of Steam, covered with thick Felt and mounted on Iron Stand ... ... Cylinder 20×10 in. 2 10 0

,, 40×10 in 3 7 6



2497

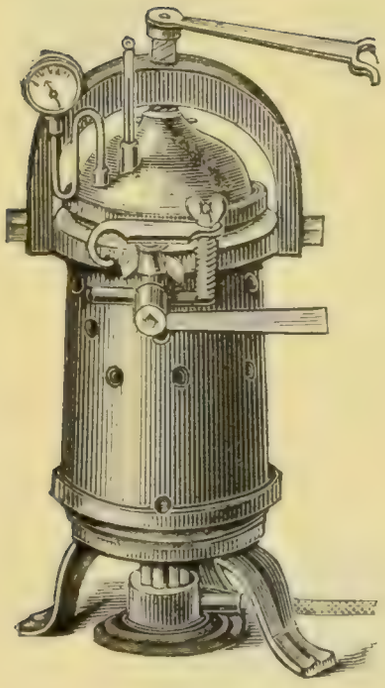




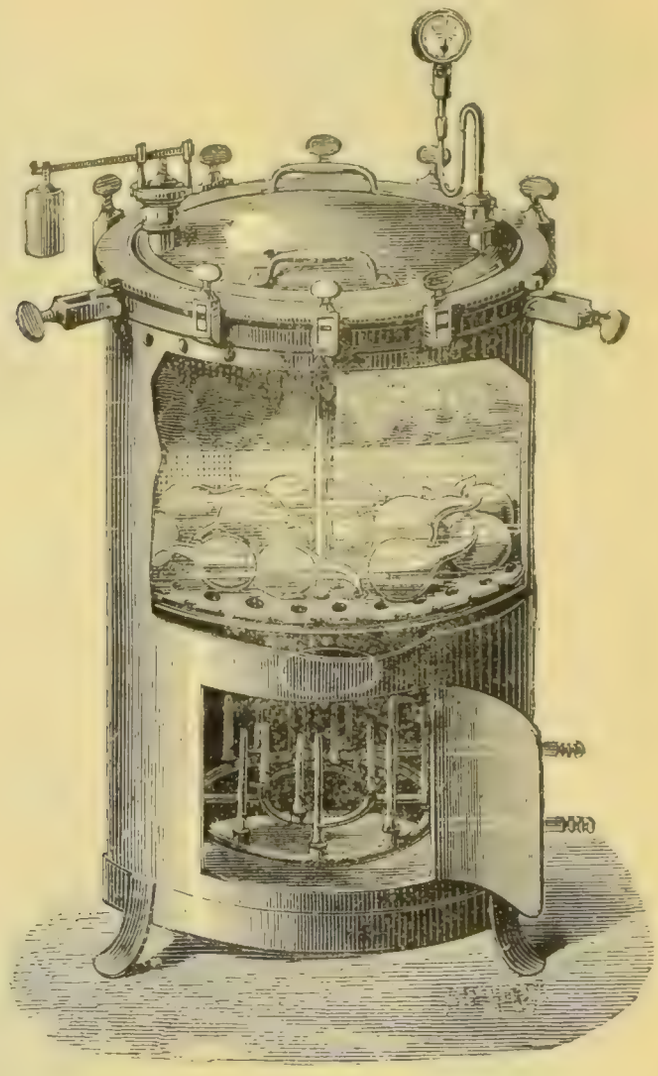
2499

2497 **Serum Steriliser,** stout Tin, fitted with Gauge and Stopcock, perforated bottom, covered with thick Felt, and mounted on Stand ... ... Cylinder 20×8 in. £1 15 0

2499 **Serum Steriliser,** Koch's, new form, Double Walled, with Double Walled Cover, for 3 Thermometers, Copper Elongated for heating the Cover, covered with thick Felt and mounted on Iron Stand 2 15 0



2500



2501

2500 **Steam Digester,** Koch's, with Iron Clamp and Central Screw, Copper Bottom, all Brass Fittings, 2 shallow Trays and Copper Wire Cylinder, dome Top of stout Iron, with Safety Valve and Gauge, tested to Ten Atmospheres—

Diameter inside, 6 in. £10 0 0

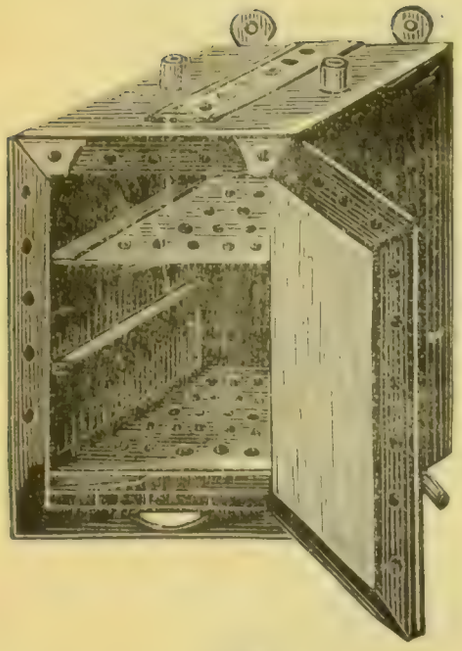
„ „ 8 in. 12 10 0

2501 **Steam Digester,** Chamberland's, Stout Copper, for Sterilising up to 115° C., all Joints Brazed, complete with Manometer and Gas Burner—

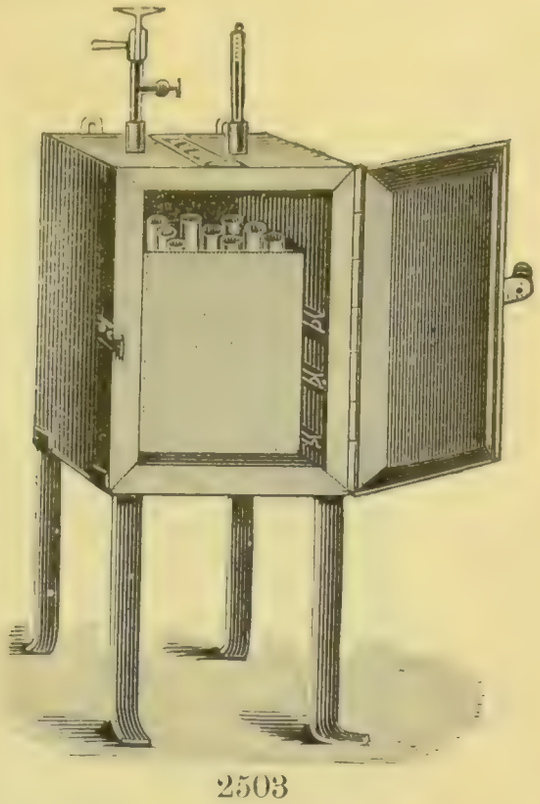
Diameter inside, $4\frac{3}{4}$ in. 8 10 0

„ „ 8 in. 12 10 0

„ „ 11 in. 15 0 0



2502



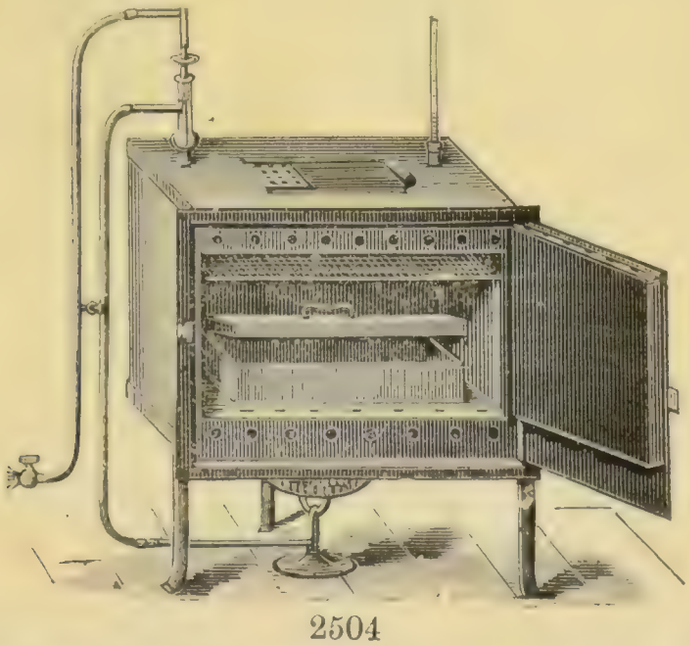
2503

2502 **Sterilising Oven,** Copper Double Walls, 11 × 10 × 16 in. high, Inner Chamber 9 × 8 × 11¼ in. high, with 2 Shelves, Perforated Sliding Ventilator at top, and 2 Apertures for Thermometer and Gas Regulator £3 10 0

2503 **Sterilising Oven,** Sheet Iron Double Walls, 2 Apertures for Thermometer and Regulator, Perforated Slide at top for regulating the air, and Eyelets for hanging on wall—

Inside measurements, 9½ × 7 × 6½ in. 1 4 0
11 × 7 × 8 in. 1 10 0
12 × 8 × 9 in. 2 10 0

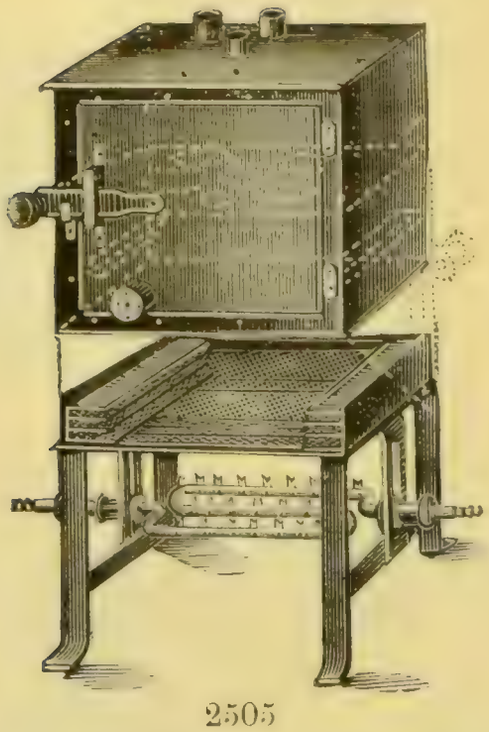
Iron Stands for the above, 3/6, 4/6, 5/6 each.



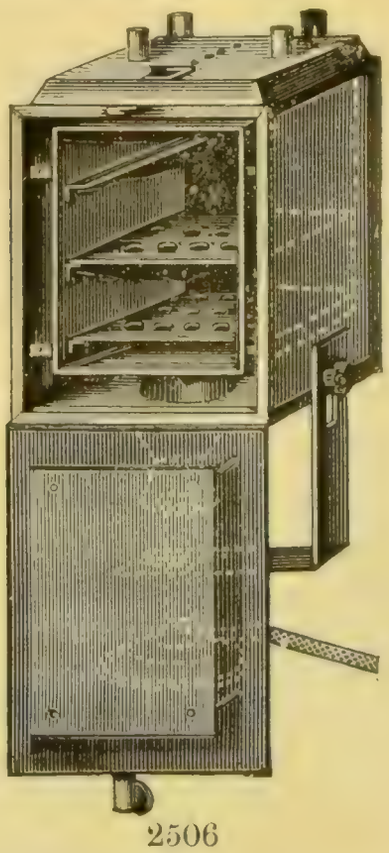
2504

2504 **Sterilising Oven,** Copper, Poupinel's, complete with Burner, Regulator and Thermometer—

Inside measurement, 15½ × 10 × 10 in. £13 10 0



2505



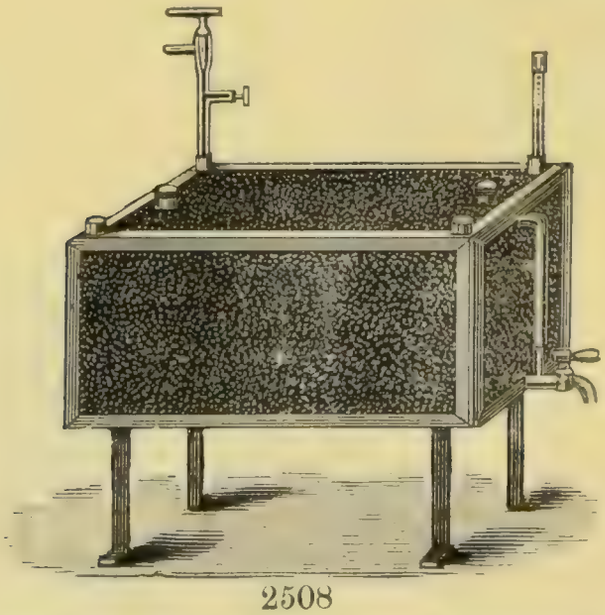
2506

2505 **Sterilising Oven,** Copper, Rudorff's, Single Wall, 10 × 6 × 8 in., with arrangement to insert Wire Gauze Frames between Oven and Burner £2 2 0

2506 **Sterilising Oven,** Kaehler's, covered with Asbestos, latest construction, with Door to fall down in front, Sliding Asbestos Tray, and constructed so that the heat passes round the inner Chamber, complete with Support for carrying Burner— Inside measurements, 7 × 9½ × 6½ in. 2 2 0

9 × 12 × 8 in. 2 10 0

11 × 18 × 11 in. 3 3 0

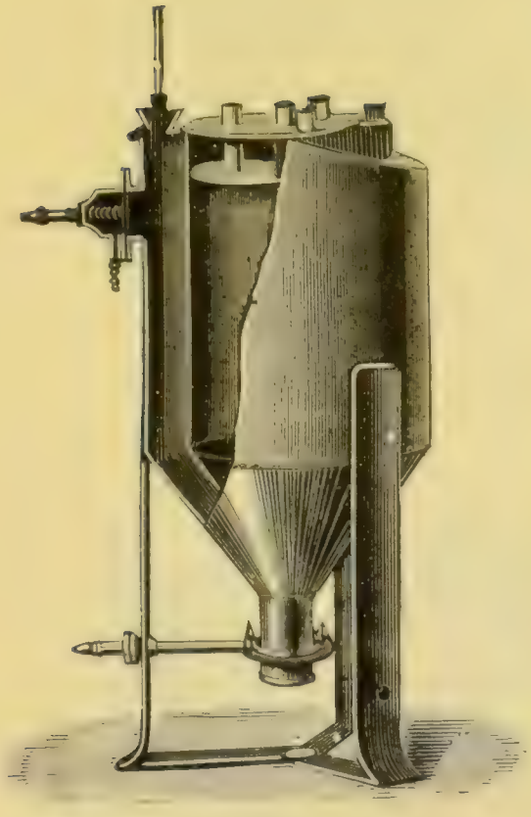


2508

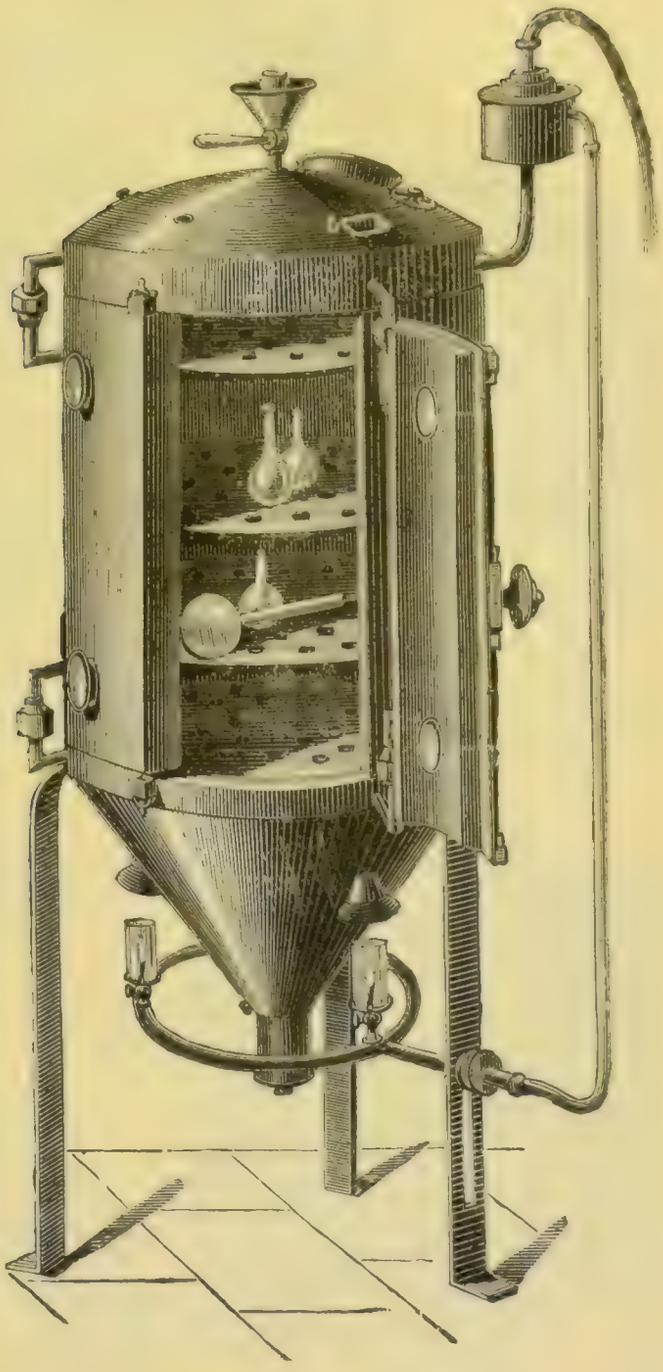
2508 **Cultivating Trough,** Sheet Iron, Double Walled, with Glass Cover, Water Gauge, Brass Stopcock, and covered with thick Felt— Inside measurements, 10 × 10 × 10 in. £2 5 0

20 × 10 × 10 in. 3 5 0

Gas Regulator extra.



2509

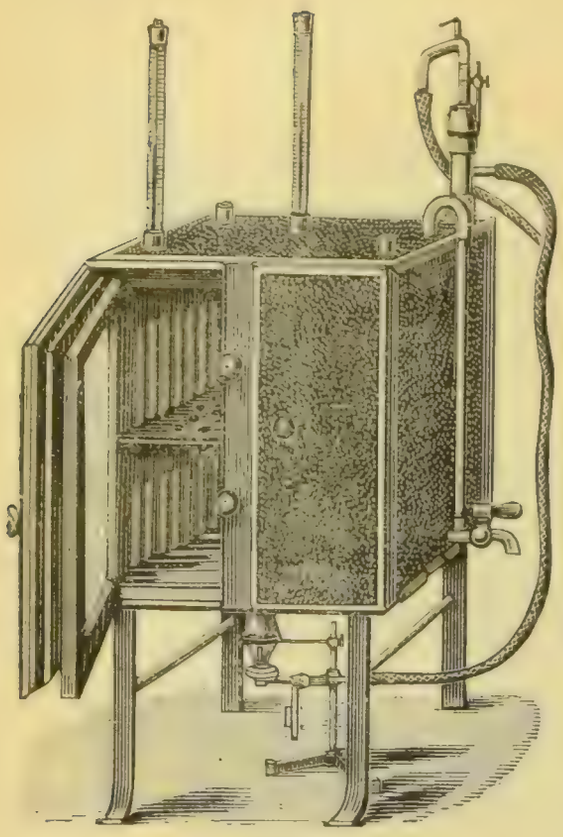


2511

2509 **Incubator,** D'Arsonval's, stout Copper, for constant low temperatures, with India Rubber Membrane Regulator and Gas Burner— Inside measurements, 10×8 in. £4 10 0

14×9 in. 6 10 0

2511 **Incubator,** D'Arsonval's, with arrangement for circulation of water in Door— Inside measurement, 13×10 in. 12 10 0

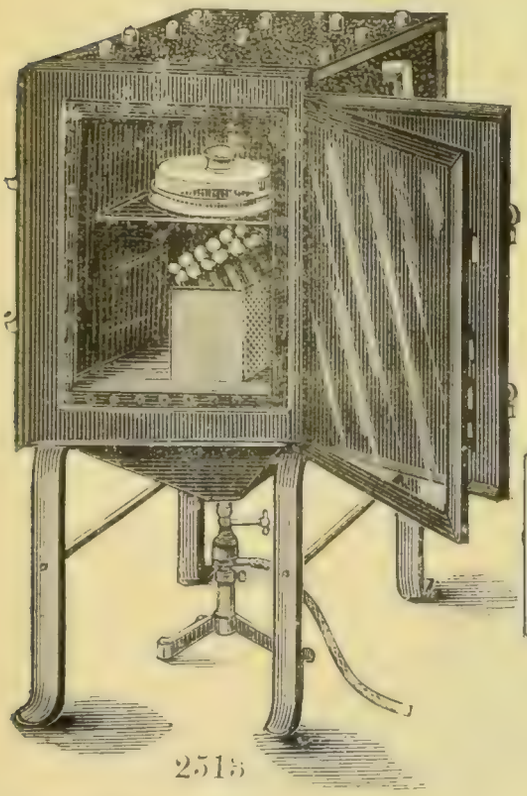


2512

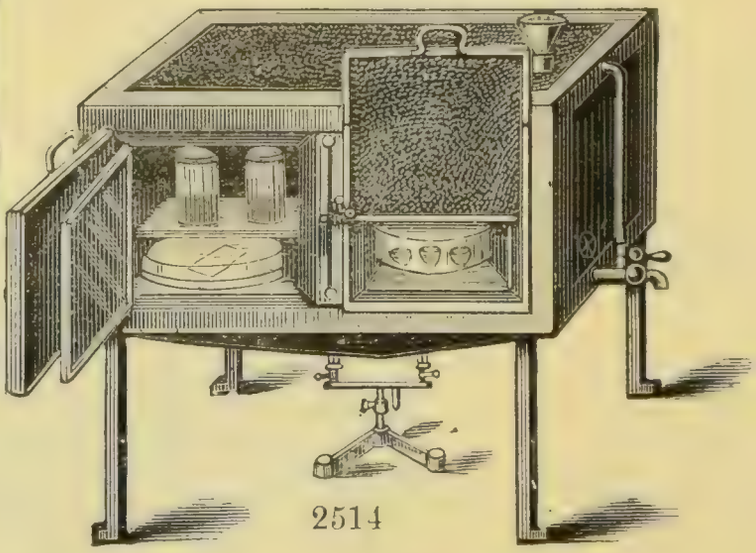
2512 **Incubator,** Rohrbeck's, for constant low temperatures, Double Walls, Double Metal and Glass Doors, Interior Walls are of Sheet Iron covered with Lead, outside covered with thick Felt, complete with Stand—

Inside measurements—

10×10×10 in.	£4	0	0
10×16×10 in.	5	0	0
10×20×10 in.	7	0	0



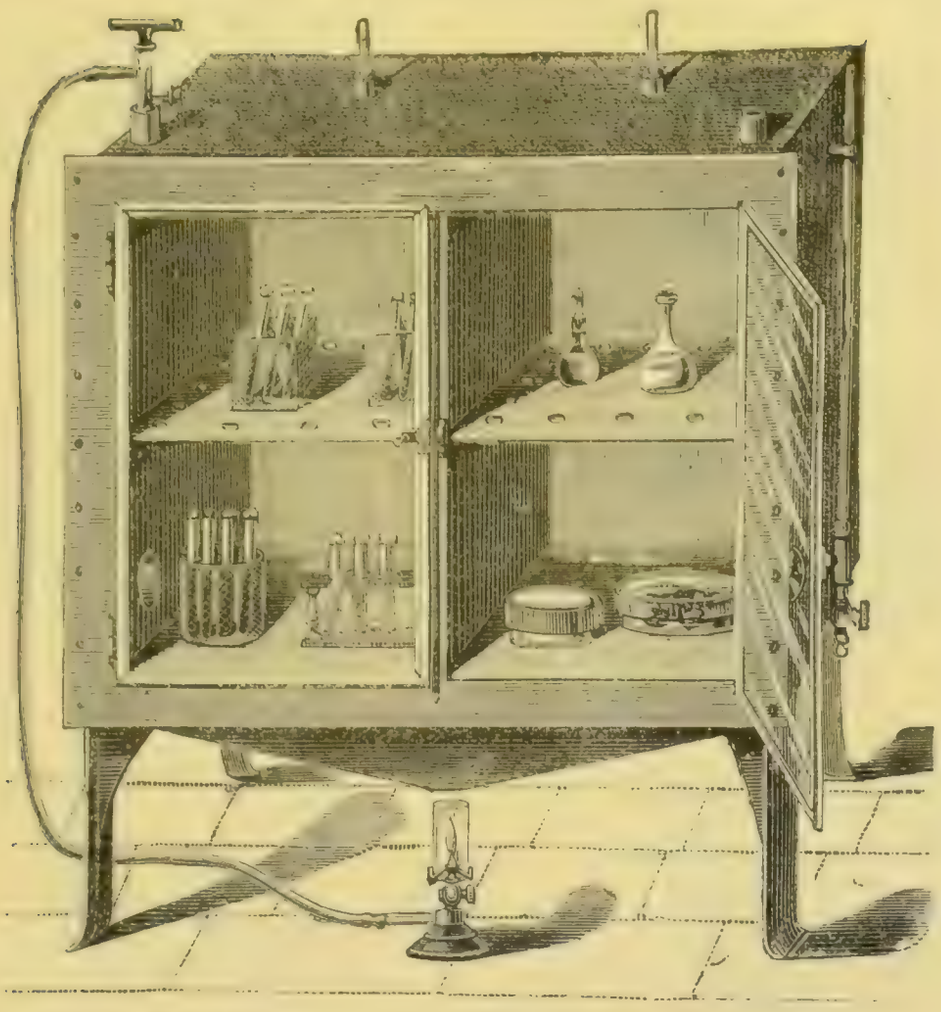
2513



2514

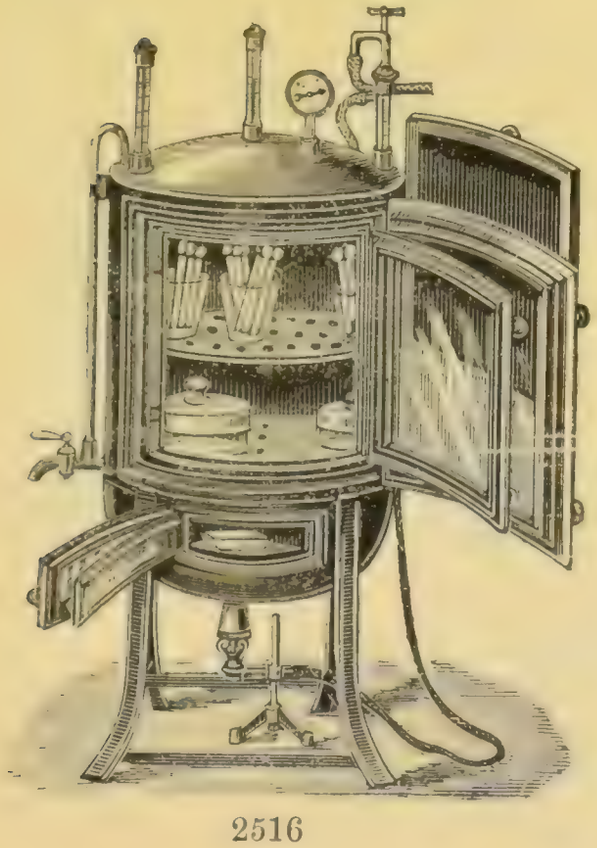
2513 **Incubator,** Hueppe's, Sheet Iron covered with Lead, Double Walls, 2 Doors for the Combustion of Gases, 2 inlets and arrangement for the air to pass through the bottom, mounted on Iron Stand with thick Felt Cover, complete with Burner— Inside measurement, 14×10×10 in. £7 10 0

2514 **Incubator,** Babe's, Sheet Iron, Double Walled, 2 Doors, 2 Chambers, Sliding Door covered with Felt, without Burner— Inside measurement, 14×10×10 in. 8 0 0



2515

2515 **Incubator,** Babe's, Copper, Double Walled, 4 Compartments, 2 Glass Doors, complete with Gauge, Burner, and Gas Regulator— Inside measurement, 20×16×12 in. £9 10 0



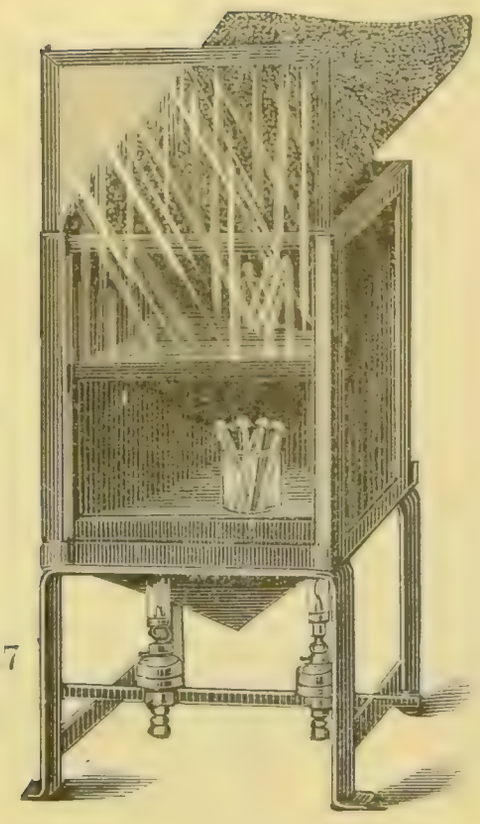
2516

2516 **Incubator,** oval form, Rohrbeck's, stout Copper, without Burner and Gas Regulator—

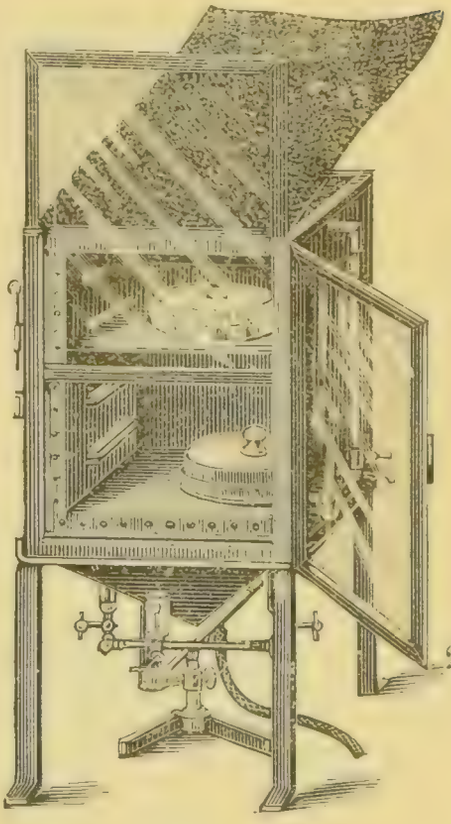
Inside measurements—

10×14×10 in. £18 0 0

16×20×10 in. 26 0 0



2517



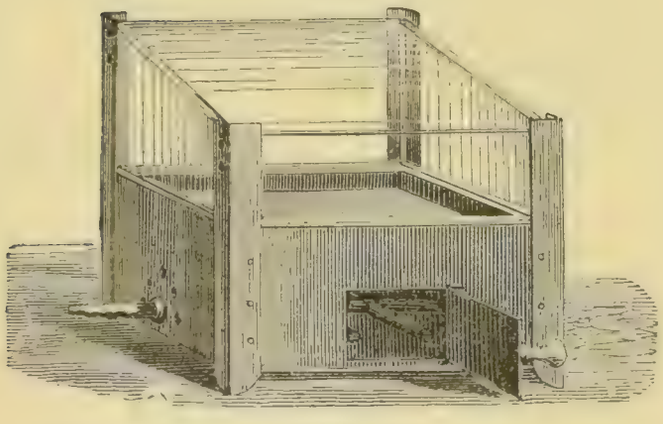
2518

2517 **Incubator,** Sheet Iron, with Glass Sliding Door, Sliding Cover, covered with thick Felt and mounted on Iron Stand, complete with Burner—

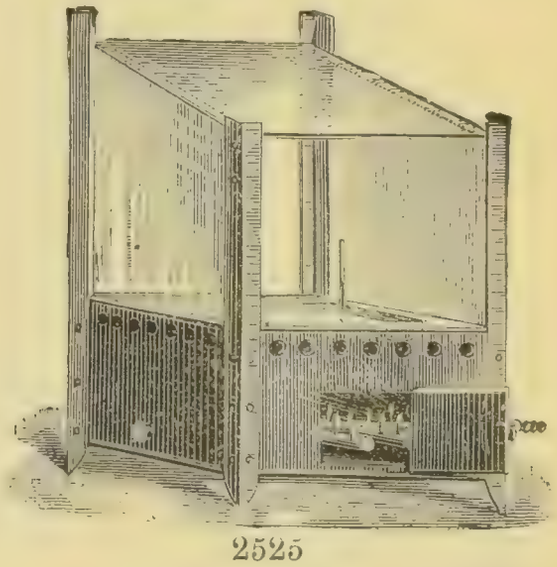
Inside measurements, 8 × 7 × 7 in.	£3	3	0
15 × 10 × 10 in.	4	4	0

2518 **Incubator,** with extra outer Glass Door—

Inside measurements, 8 × 7 × 7 in.	3	10	0
15 × 10 × 10 in.	4	15	0



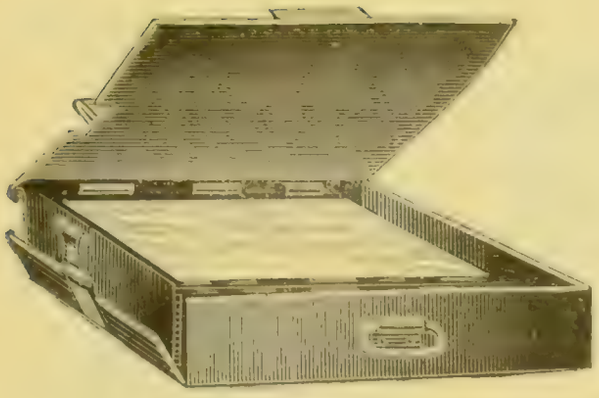
2524



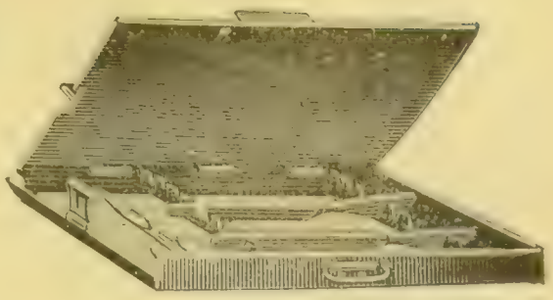
2525

2524 **Hot Air Bath,** Schloesing's, Glass Sides and Top, 10 × 10 × 10 in., for Evaporation of Acids, with Burner complete £1 10 0

2525 **Hot Air Bath,** Yvon's, Glass Sides and Top, 10 × 10 × 10 in., for drying Filters 2 0 0



2526

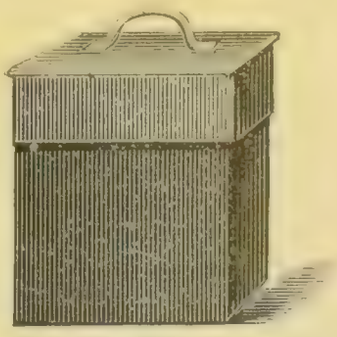


2527

2526 **Copper Case,** Israel's, for Sterilising Gelatine Plates ... £0 9 0
2527 **Brass Case,** for Sterilising Instruments 0 11 6
2528 „ „ „ „ with Knife Rest ... 0 14 0

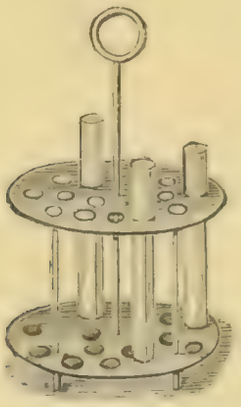


2529

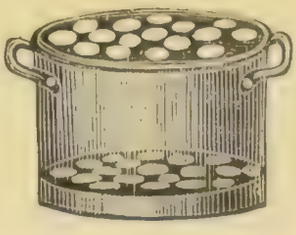


2530

2529 **Wire Basket,** Galvanised Iron, for Sterilising Test Tubes ... £0 2 0
2529A „ Tinned Wire, with Moveable Basket ... 0 4 6
2530 **Iron Case,** for Sterilising Glass Plates in Sterilising Oven—
5×3 in. each 0 2 6
5×4 in. „ 0 3 6
6×5 in. „ 0 4 6



2531

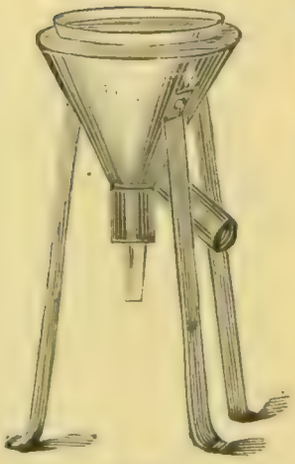


528

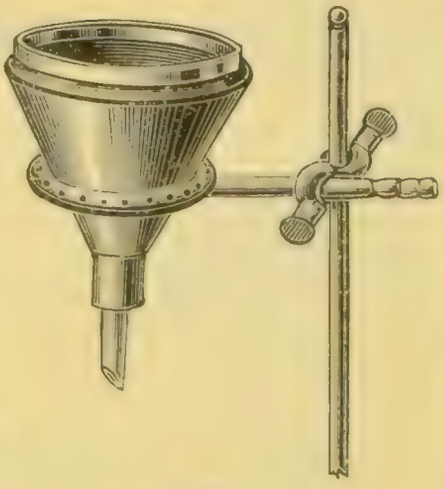
2531 **Copper Support,** for holding Test Tubes used for Sterilising in Water Bath ... ... 5 in. diam. £0 3 0
6 in. „ 0 4 6
528 **Copper Water Bath,** for Test Tubes, with Tripod Stand, 6 in. diam. 0 13 6



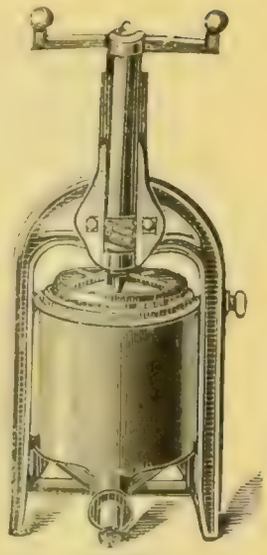
494



529



529A



2532

494 **Water Bath,** Copper, with 4 Rings for Basins, &c.—

Diam. of outer Pan 5 in.	...	£0	6 0
,, ,, 6 in.	...	0	9 6
,, ,, 8 in.	...	0	12 6
,, ,, 9 in., 5 rings		0	15 0

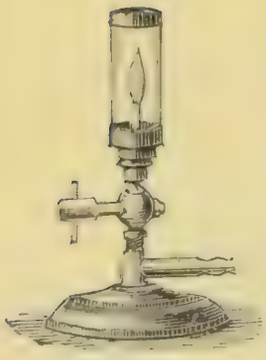
529 **Hot Water Funnel Jacket,** Copper, on 3 Legs, with Funnel 4 in. diam., complete... ... Single Jacket 0 7 6

Double ,, 0 12 0

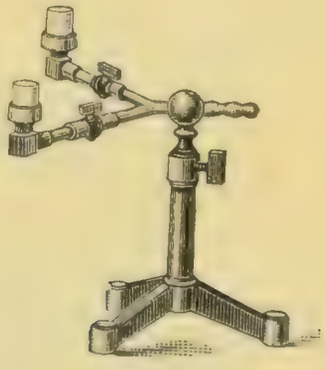
529A **Hot Water Funnel Jacket,** 4 in. diam., Brazed Copper, Ring Burner with Stopcock for fixing on Retort Stand ... 0 11 6

2532 **Meat Press,** Iron, with Perforated Zinc Cylinder—

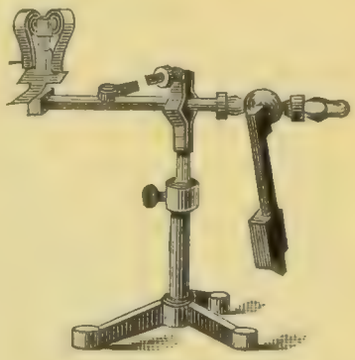
Capacity 1 litre each		0	12 6
,, 2 ,,		1	10 0
,, 4 ,,		2	0 0
,, 15 ,,		4	10 0



2533



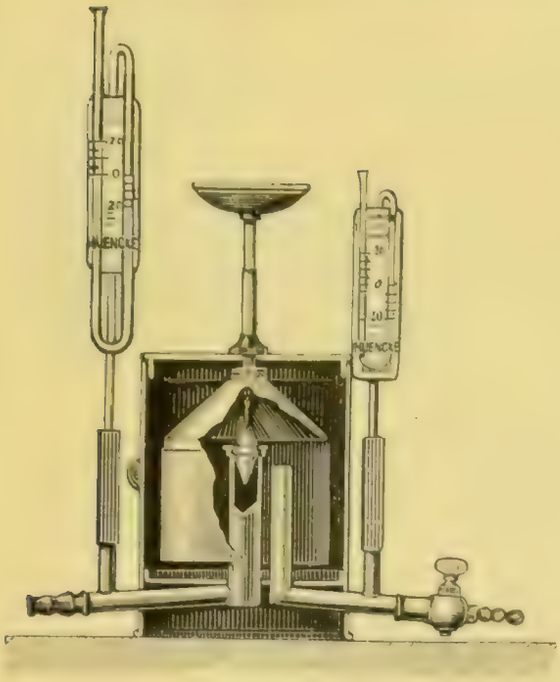
2534



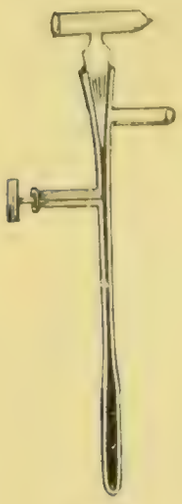
2537

2533 **Gas Burners,** Mica Chimney, with Stopcock and Iron Foot,

1 Jet	£0	7	0
2534 ,, ,, ,, ,, ,, 2 Jets	0	11	6
2535 ,, ,, ,, ,, ,, 3 ,,	0	17	6
2536 ,, ,, ,, ,, ,, 4 ,,	1	4	0
2537 ,, Koch's, Automatic, 1 Jet	1	1	0
,, ,, ,, 2 Jets	2	0	0
Iron Tripod Stand for above to raise or lower the Burner ...	0	3	6



2538



707

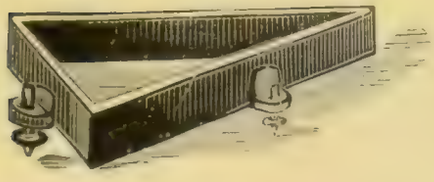


708

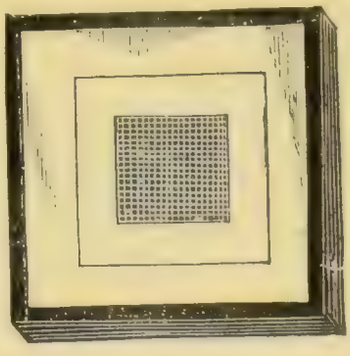
2538 **Gas Regulator,** Moitessier's, for use with Glycerine, stout Brass, with 2 Manometers and Regulating Stopcock ... £2 5 0

707 **Gas Regulator,** Reichart's 0 5 0

708 „ Page's 0 2 6



530



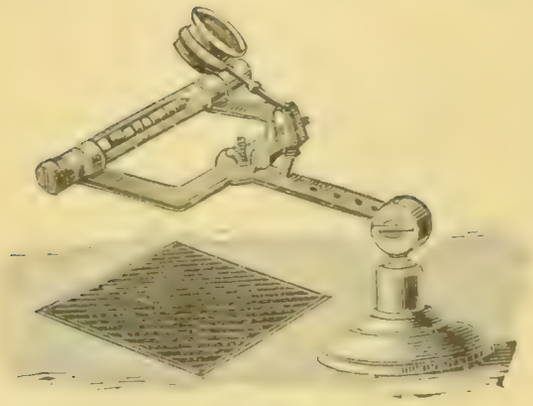
2539

530 **Tripod Levelling Stand,** Strong Polished Oak and Brass Mounts, Outside Measure 14¼ in., for Levelling Glass Plates, Dishes, &c. £0 6 6

2539 **Counting Apparatus,** for Bacteria, Wolffhugel's, strong Polished Wood, with Drawer, Bottom Plate of Black Glass, Counting Plate of Stout Plate Glass divided into centimetres, Diagonal Squares divided into ¼ centimetres 0 15 6

2540 **Counting Apparatus,** same as above, Plain Wood, without Drawer 0 12 6

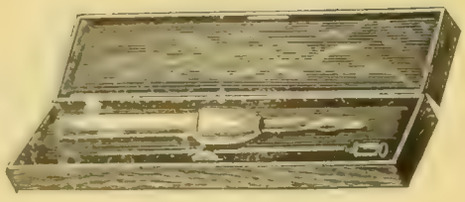
2541 **Magnifying Glass,** for above, with 2 Convex Lenses, in Brass Frame 0 3 0



2542



2543



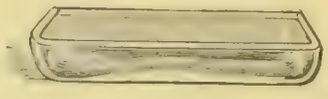
2543A

2542 **Counting Apparatus,** Esmarch's, for counting Bacteria in Test Tubes, mounted on Stand £0 19 0

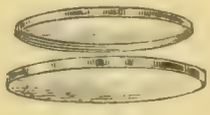
2543 **Injection Syringe,** Koch's, Graduated Tube and Nickel Plated Stopcock, with India Rubber Ball, in Case—

1	5	10 grammes
5/6	9/	11/ each

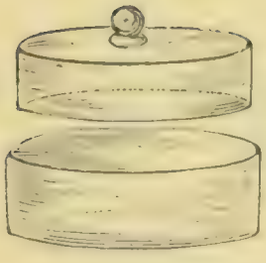
2543A **Injection Tube,** Koch's, Graduated, in Case, complete ... 0 12 6



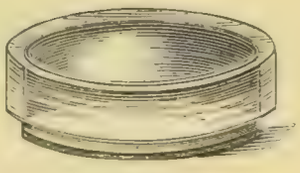
2543B



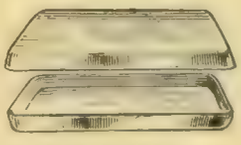
2543E



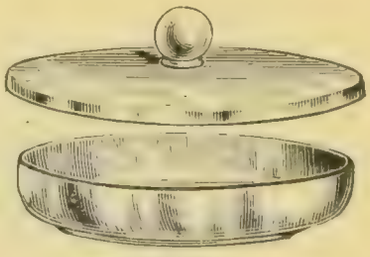
2543C



2543D



2543F



2543G

2543B **Glass Dishes,** Shallow, for Micro Slides, $3\frac{1}{4} \times 1\frac{1}{4}$ in. inside, polished inside and out ... each £0 0 8

2543C ,, ,, Stout, with Polished Edges for Damp Chambers, and Plate Cultivations—

$6 \times 2\frac{3}{4}$	9 × 3 in.
2/9	3/ per pair

2543D ,, ,, without Knobs (Koch's), height of lower vessel about $\frac{3}{4}$ in.—

$2\frac{1}{4}$	3	4	$4\frac{3}{4}$	6 in. diam.
9d.	1/	1/3	1/9	2/6 each

2543E ,, ,, Petrie's, very Shallow—

$2\frac{1}{4}$	3	4	6 in. diam.
7d.	9d.	1/	2/6 each

2543F ,, ,, Square, with Cover, 4 × 4 in. ... each 0 1 0

2543G ,, ,, with Cover, 9 in. diam. 0 2 9



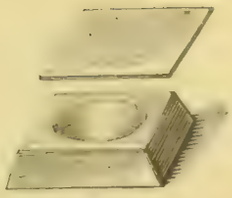
2543H



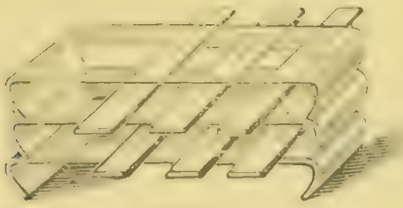
2547



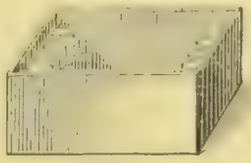
2548



2549



2550



2550A

2543H **Glass Dishes,** Stout, Ground Glass Cover, with Knob—

Height	4¼	4½	5½	in.
Diameter at bottom	5	6	7	in.
	5/	6/6	8/	each

2547 „ „ with Ground Concave Cover—

Diameter	2¾	in.	...	each	£0	0 9
„	4	„	...	„	0	1 0
„	5	„	...	„	0	1 2

2548 **Glass Preparation Boxes,** with Flat Grooved Cover—

1		in.	...	each	0	0 9
1½		„	...	„	0	1 0
2		„	...	„	0	1 2

2549 **Glass Blocks,** White, with Cavity in centre, and Flat Glass Cover ... ... each 0 0 5

„ „ Black ... ... „ 0 0 6

2550 **Glass Benches,** Ends curved in one piece for supporting Glass Plates ... ... each 0 0 6

2550A **Porcelain Troughs,** 3¼ × 2¼ × 1⅜ in., with Ribs inside for holding 5 Micro Slides ... ... each 0 1 6



2550B



2550C



2550D



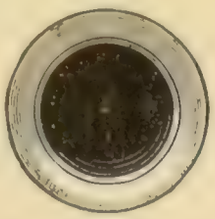
2550E



2550G



2550H

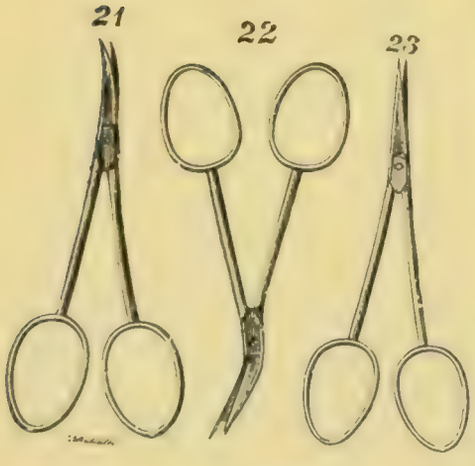


2550J

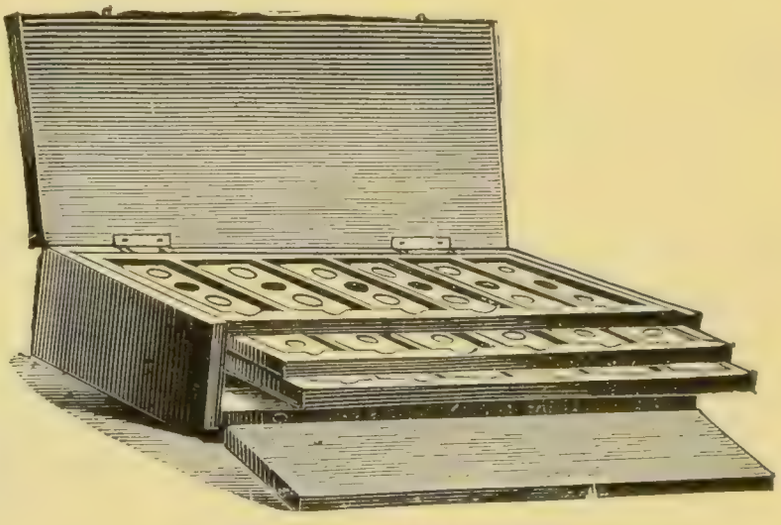


2550K

2550B	**Culture Tubes,** Recklinghausen's	each	£0 1 0
2550C	, ,, Welfarth's	,,	0 0 9
2550D	,, ,, ,, with Side Tube ...	,,	0 1 0
2550E	,, ,, Hueppe's		0 0 9
2550F	**Nutrient Tubes** of Agar-Agar and Peptone, Gelatin Sterile,	per doz.	0 6 0
2550G	**Bulbs,** Sternberg's, for Storing purposes		0 1 9
2550H	**Test Tubes,** Aitken's		0 1 9
2550J	**Plate,** White Stoneware, 9 in. diam., black inside, for Examination of Sputum	each	0 1 6
2550K	**Pipettes,** for Microscopic Filtration, 2 Ground Discs in centre, held together by India Rubber Bands	each	0 1 4



2553



2554A

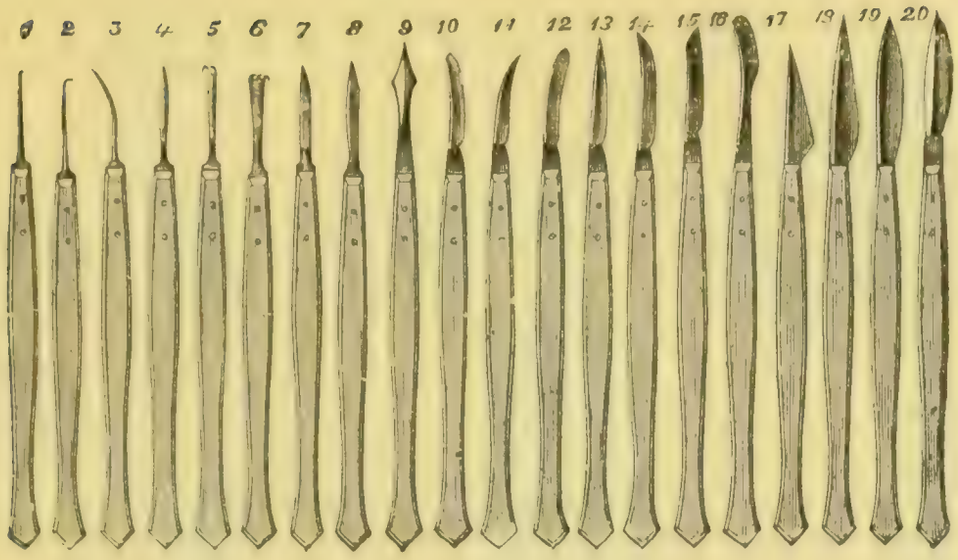
2553	**Scissors,** Best Polished Steel, Straight	...each 2/ and	£0 2 6
	,, ,, ,, Curved	... ,, 3/ ,,	0 4 0
2554	**Needles or Teasers**	per doz.	0 2 6

2554A **Cabinet,** for holding the Microscopical Slides, Polished Pine—

For 36	72	144 Slides
2/9	4/	7/6 each

2554B ,, Polished Pine, with Glass Door, Lock and Key—

For 200	300	500 Slides
30/	42/	60/ each



2555

2555	**Knives,** Dissecting, Ebony Handles, various ...	each	£0	1	3
	,, ,, Ivory ,, ,, ...	,,	0	1	6
2556	**Section Lifters**	each 8d., 1/ and	0	1	6
2557	**Valantin's Section Knife**		0	12	6
2558	**Dissecting Instruments,** consisting of 1 Scalpel, Knife, Straight Scissors, Forceps and 2 Needles, in Polished Mahogany Case		0	10	6
2559	,, ,, consisting of 3 Knives, 1 Hook, Scissors, and Forceps, in Leather Case ...		0	14	6
2560	,, ,, 4 Knives, 2 Hooks, Scissors, and Forceps, in Leather Case		0	17	6
2561	,, ,, Scaletanged Scalpel, 2 Scalpels, Curved Scoop and Scraper, Cutting Nippers and Pliers combined, Narrow Knife, in Leather Case		1	5	0

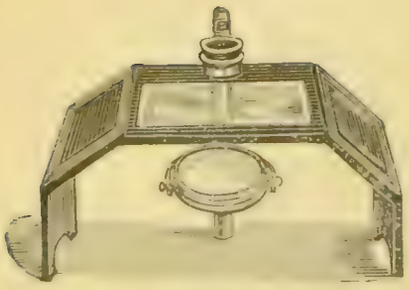


2561A

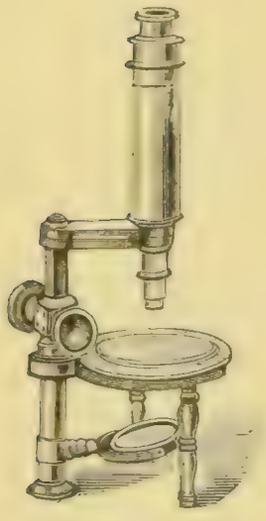


2561B

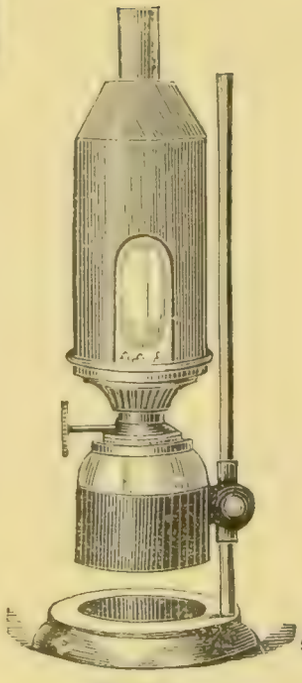
2561A	**Forceps,** Vulcanite, for lifting Micro Slides ...	each	£0	0	8
2561B	,, Steel, 4 in., with Flat Points, for lifting Micro Circles, &c.		0	2	0



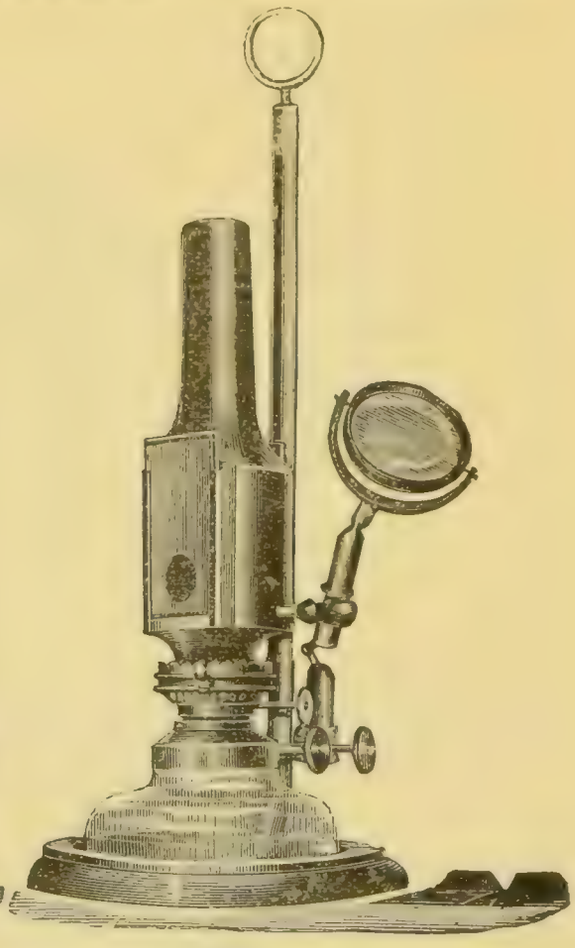
2570



2572



2576



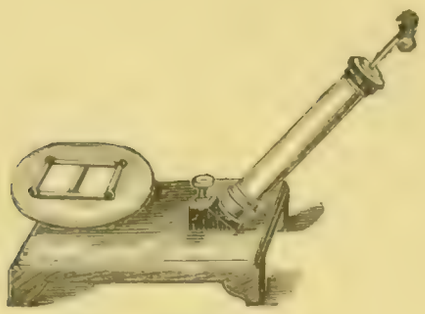
2576B

2570	**Microscope,** Dissecting, on Iron Stand, Glass Stage	...	£0	16	6
2571	,, ,, with Rackwork Adjustment	...	1	1	0
2572	,, ,, Brass Stand, Circular Glass Stage 4 in. diam., with $\frac{1}{4}$, $\frac{1}{2}$, and 1 in. Powers, in Polished Mahogany Case	...	3	10	0
2573	,, ,, the arm is made in two portions, the lower half carrying the Objectives, is fixed, the upper half having the Body, can be turned on its centre so that the Objective can be used alone, converting it from a Compound to a Single Microscope, with Eye-Pieces and two sets Achromatic Lenses 1 in. and 2 in., in Polished Mahogany Cabinet	...	3	15	0
	Double Nose Piece for above	...	0	15	6

For other Microscopes, see page 159.

Microtomes, *see page* 164.

2576	**Microscope Lamp,** in Polished Pine Case, Brass Stand and Porcelain Shade	... ...	0	15	6
2576A	,, ,, larger size	... ...	1	2	6
2576B	,, ,, Nelson's, with Metal Chimney, extra Diaphragms, or Blue Chimney and Porcelain Shade, in Pine Cabinet, with Condenser	... ...	1	15	0
	,, ,, Ditto	without Condenser	1	7	6
	Blue or White Chimneys for above	... each	0	0	5
	Porcelain Shades for above	... ... ,,	0	1	6



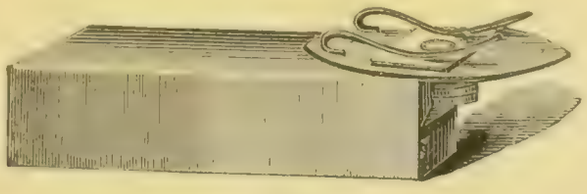
2576c

2576c **Air Pump,** Brass Barrel, 5 × $\frac{7}{8}$ in., Plate 4 in. diam., on Polished Mahogany Stand, with Support for holding 4 Glass Micro Slides £0 16 6

Receiver for ditto, ground 0 1 6

2576b **Labels for Microscopic Objects** ... ... per packet 0 0 8

Microscopic Objects, mounted or unmounted, supplied to order.

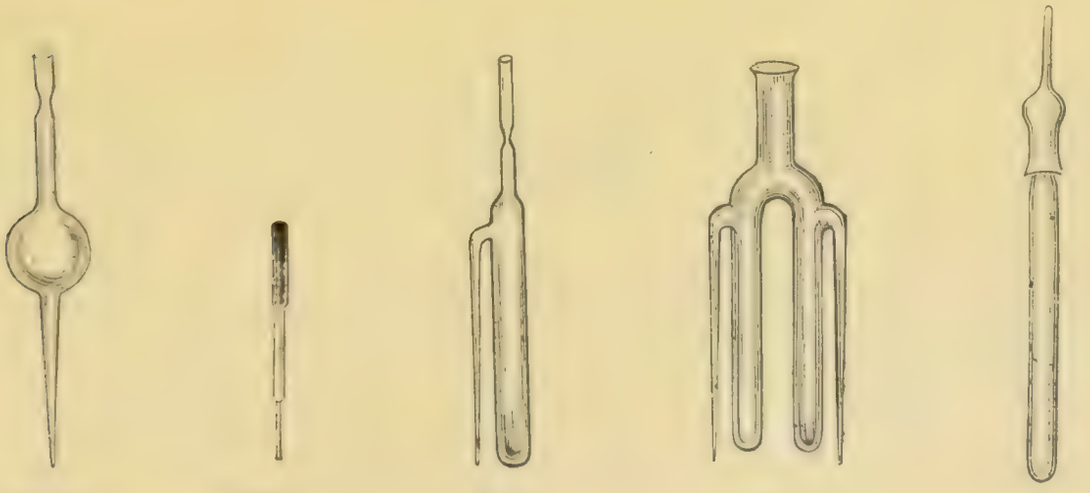


2578

2578 **Turntable,** Brass, Revolving, on Mahogany Block ... £0 7 6

2579 ,, Aylward's concentric 0 15 0

Corks for Mounting Objects ... ... per doz. 0 0 4



2580 2580A 2581 2582 2583

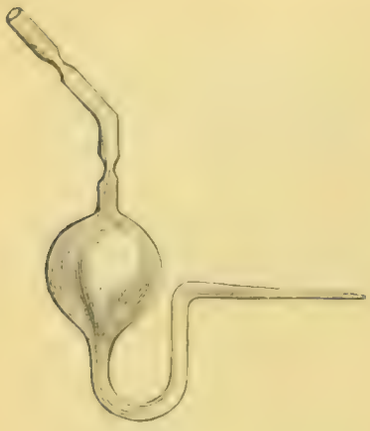
2580 **Pipettes,** Pasteur's ... ... each £0 0 8

2580A ,, with Rubber Top ... ... ,, 0 0 3

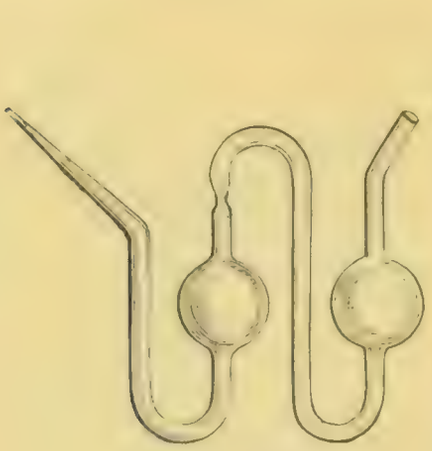
2581 **Culture Tubes,** Chamberland's 0 0 8

2582 ,, ,, ,, double 0 1 6

2583 ,, ,, Pasteur's, with Glass Cap 0 0 8



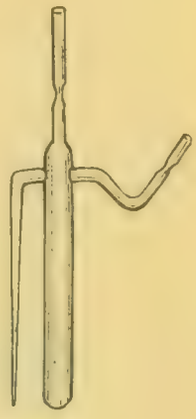
2584



2585



2586

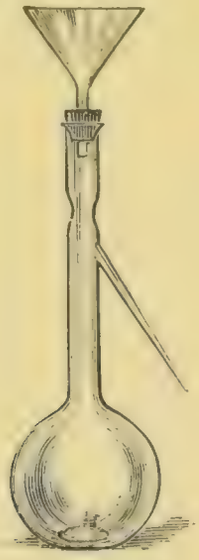


2587

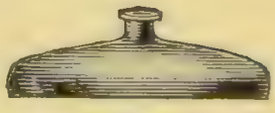
2584	Miguel's Bulb Tube, single	£0	1 0
2585	,, ,, double	0	1 6
2586	Chamberland's ,, ...	0	0 6
2587	Duclaux's ,, ...	0	1 3



602



602B



602D

602 **Flask,** Sir J. Lister's, for the Cultivation of Bacteria ... £0 2 3

602A **Pasteur's Flask,** Round Bottom, with Side Tube pointed—

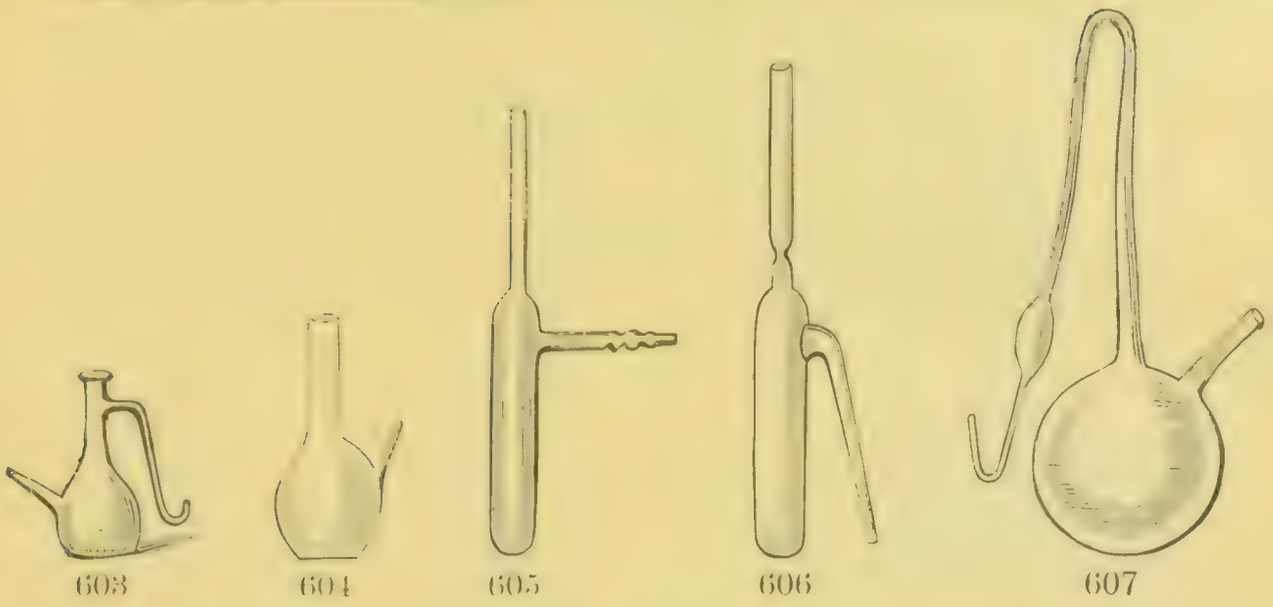
Capacity	250	500	1000 c.c.
	1/6	2/6	3/6 each

602B **Flask,** Miguel's, with Funnel, capacity 250 c.c. 0 1 6

602C ,, ,, without ,, ,, 250 c.c. 0 1 3

602D ,, Shallow, with perfectly Flat Bottom, for Cultivation of Bacteria—

Capacity	8	16 ozs.
	8d.	1/ each



603 604 605 606 607

603 **Pasteur's Flask,** with Side Tube and long Bent Arm—

Capacity	250	500	1000 c.c.
	1/6	2/	3/ each

604 „ „ with Side Tube—

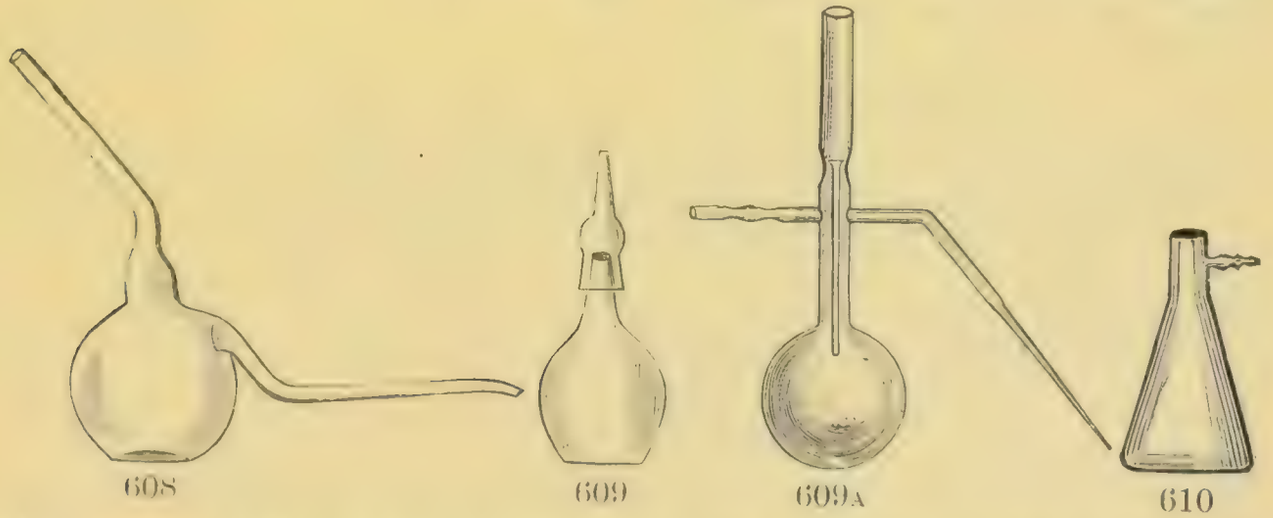
Capacity	125	250	500	1000	2000 c.c.
	8d.	10d.	1/3	2/	3/ each

605 **Pasteur's Flask,** Cylindrical, with Side Tube pointed each £0 0 10

606 „ „ „ „ bent „ 0 0 10

607 „ „ Round or Pear Shape, with bent Tube and Bulb—

Capacity	125	250	500	1000	2000 c.c.
	1	1/6	2/6	3/	4/ each



608 609 609A 610

608 **Pasteur's Flask,** with Side Tube and bent Neck, same price as 607.

609 „ „ with Cover—

Capacity	50	100 c.c.
	10d.	1/ each

609A **Flask,** Klebs' and Tiegel's, with porous Clay Tube—

Capacity	500	1000 c.c.
	4/	5/ each

610 **Bunsen's Erlenmeyer Flask,** for Filtration—

Capacity	250	500	750	1000 c.c.
	10d.	1/3	1/5	1/9 each



2588



2589



2590

2588 **Hesse's Apparatus,** for the Collecting and Cultivation of Air Bacteria, on Tripod Stand, complete £2 10 0

2589 **Strauss and Würtz** ditto 0 5 0

2590 **Hueppe's** ditto 0 2 0

2591 **Tube,** Gayon's 0 1 3

2591A ,, ,, and Dupetit's 0 5 0

Mounting Media and Staining Fluids for use with the Microscope.

In Bottles containing about 3 oz., price 1/ each.

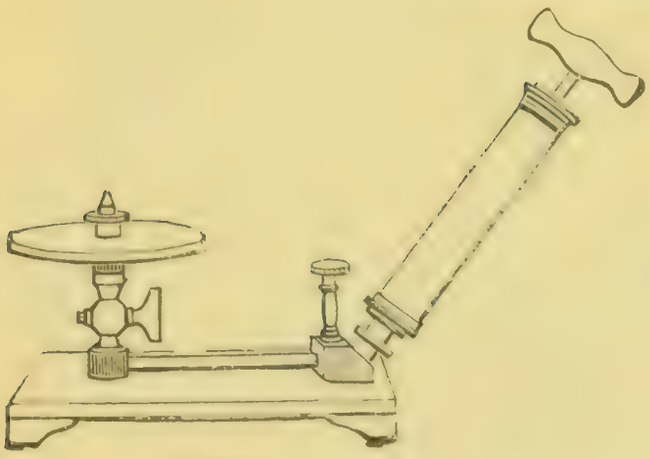
Canada Balsam
Balsam and Benzole
,, ,, Chloroform
Damar
Farrant's Solution
Deane's Medium
Glycerine Jelly
Gold Size
Asphaltum
Marine Glue
Liquid Marine Glue
Special Gum
Cleaning Solution
Paraffin and Lard
Creasote Mixture
Glycerine

Carbolic Acid
Brown Cement
Matt Black
Zinc Varnish, White
Beale's Carmine
Alum ,,
Ammonia ,,
Methylene Blue
Magenta
Bismarck Brown
Eosine Spirit
,, Water
Methyl Violet
Picro Carmine
Hæmatoxylin
Iodine, Green

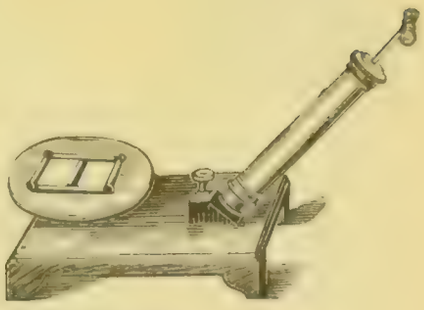
Gibbe's Magenta
,, Chrysiodine
Fuschine
Varnishes, Coloured—
Black
Red
Blue
Green
Yellow
Rose
Drab
Ruby
Slate
Magenta
Purple
Orange

Other Preparations made to order.

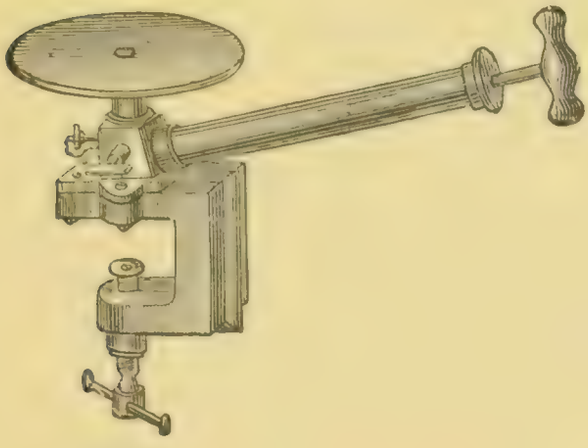
PNEUMATICS.



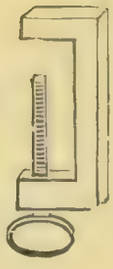
1742



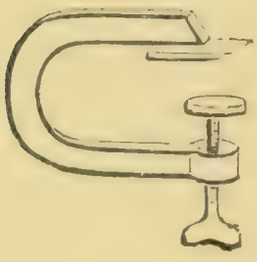
1742A



1742B



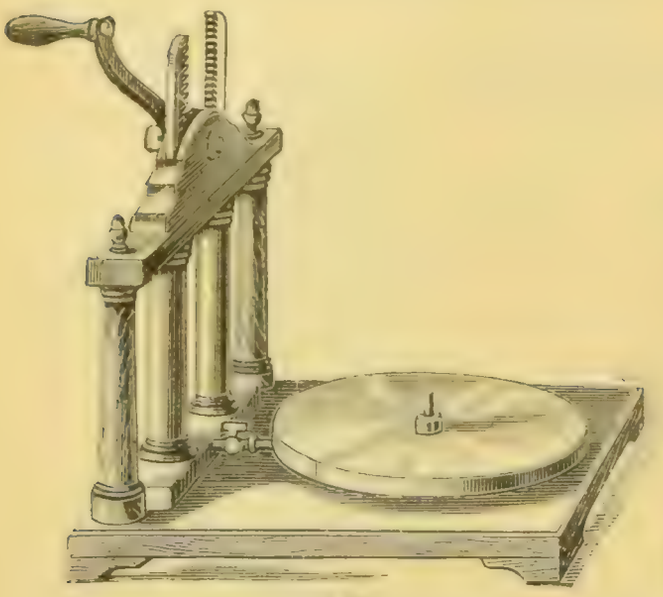
1744



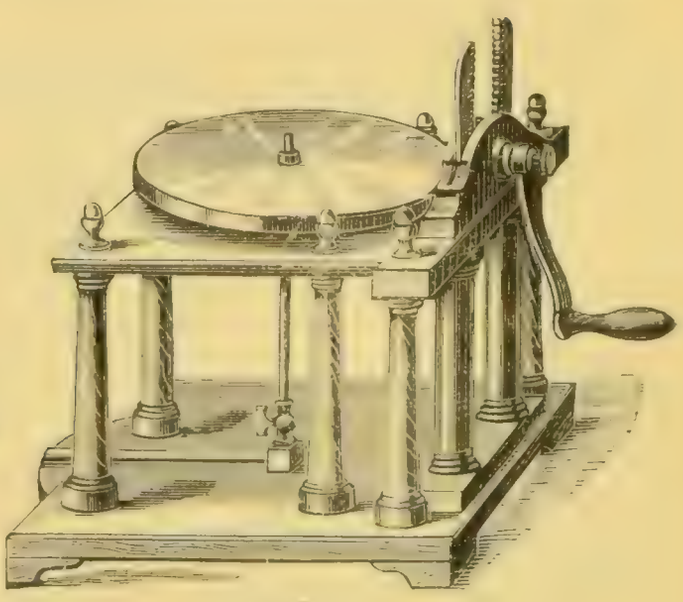
1746

AIR PUMP APPARATUS.

1741	**Air Pump,** with Brass Barrel, 5 × 1 in., Plate $4\frac{1}{4}$ in. diameter, without Stopcock, on Polished Mahogany Stand	£0	18 6
1742	,, With Stopcock, 5 × 1 in., Plate $4\frac{1}{4}$ in. diameter ...	1	3 0
	,, $7 \times 1\frac{1}{4}$ in. ,, 5 in. ,, ...	1	5 0
	,, $8 \times 1\frac{1}{2}$ in. ,, $5\frac{3}{4}$ in. ,, ...	1	15 0
1742A	,, With Brass Barrel, 5 × $\frac{7}{8}$ in., Plate 4 in. diameter, on Polished Mahogany Stand, with Support for holding 4 Glass Microscopic Slides ...	0	16 6
	Glass Receiver for above	0	1 6
1742B	,, Brass Barrel, $10 \times 1\frac{1}{4}$ in., mounted on strong Iron Clamp for Screwing to Table, and fitted with stout Ground Glass Plate $7\frac{1}{2}$ in. diameter ...	3	3 0
1744	Clamp, Malleable Iron, strong	0	3 0
1746	,, ,, ,, ... 1/ and	0	2 0
1746A	Spanner, Steel, for Air Pumps ... .. each	0	1 6



1747



1748

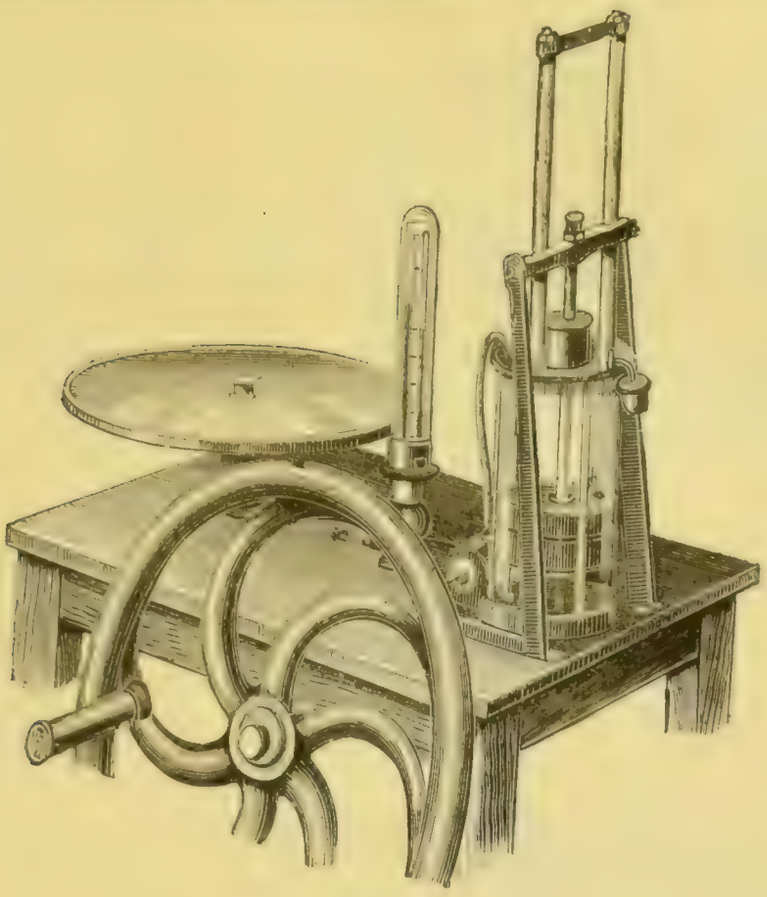
1747 **Air Pump,** Double Barrel, on Polished Mahogany Stand—

		Plate 7 in. diameter	£5	0 0
		„ 8 „ „	5	15 0
1748	„ „ „ on Raised Stand, with Gauge Plate and Stopcock	Plate 8 in. diameter	8	10 0



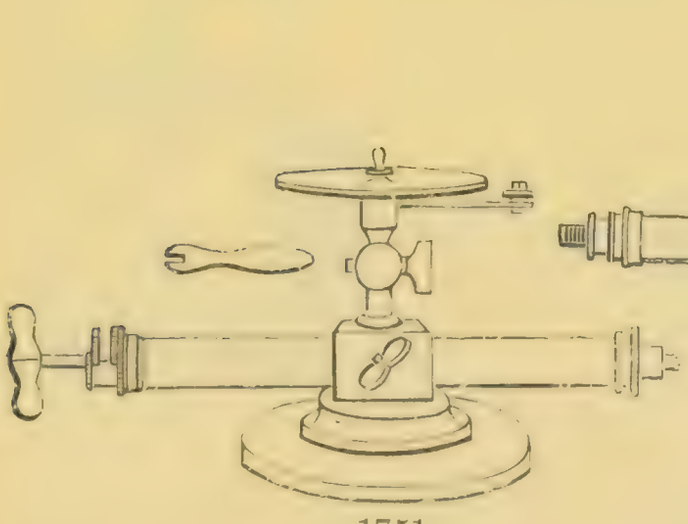
1748A

1748A **Air Pump,** Double Barrel, 10 in. Plate, with 2 strong Glass Cylinders $8\frac{1}{2} \times 2\frac{1}{2}$ in., and Vacuum Gauge, mounted on Polished Mahogany Base £17 10 0

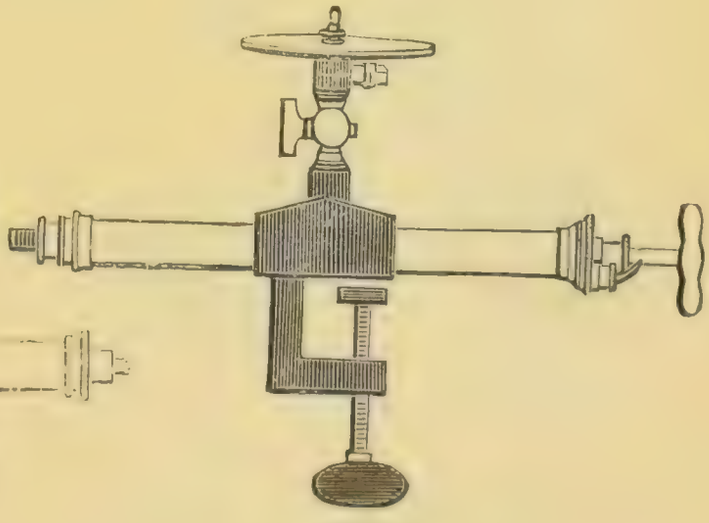


1748B

1748B **Air Pump,** Double Action, stout Glass Barrel, mounted on Wood Table, with Driving Wheel 2 ft. 9 in. diameter, Ground Glass Plate 9½ in. diameter, mounted on Iron Base, and Manometer complete £30 0 0



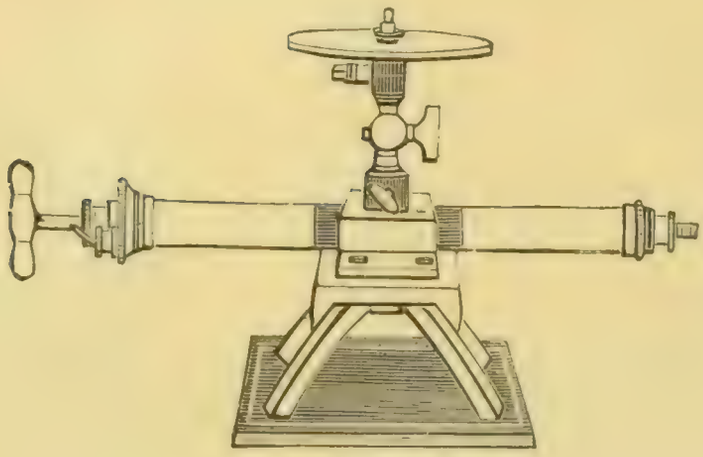
1751



1752

1751 **Air Pump,** Tate's, Plate 7 in. diameter, Brass Barrel 16 × 1½ in., mounted on solid Iron Base, with Key £3 12 6

1752 **Air Pump,** Tate's, with strong Brass Clamp to fix securely on Table, Brass Barrel 16 × 1½ in., Plate 7 in. diameter, as recommended by the Science and Art Department ... 3 7 6



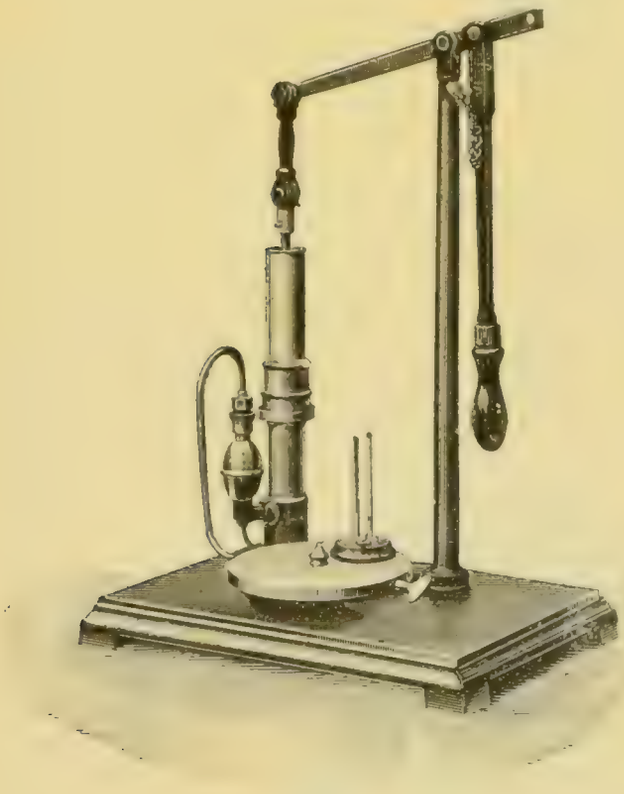
1753



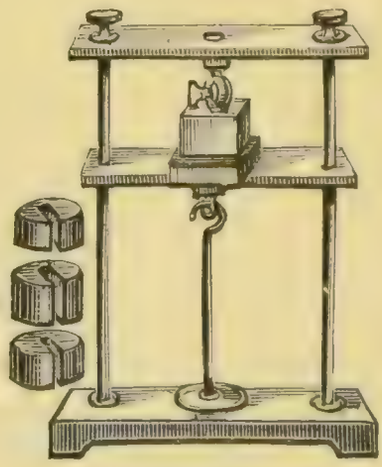
1754

1753 **Air Pump,** Tate's, Brass Barrel 16 × 1½ in., Plate 7 in. diameter, for Syphon Gauge, mounted on a Japanned Iron Stand £3 15 0

1754 „ „ Syphon Gauge Plate and Arm 0 8 6



1754A

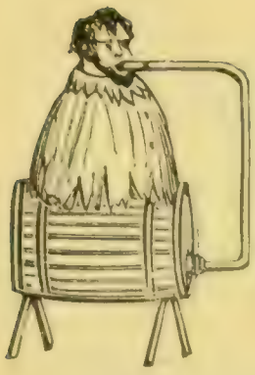


1755

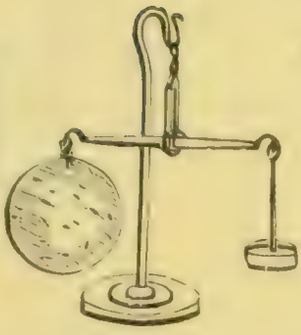
1754A **Air Pump,** Fleuss' Patent, mounted on Iron Base No. 1 £5 0 0
No. 2 8 0 0

The advantages claimed for this Pump are simplicity and reliability, there being nothing to give trouble or to go wrong, all the working parts being almost frictionless, and immersed in oil. The vacuum can be retained for any length of time.

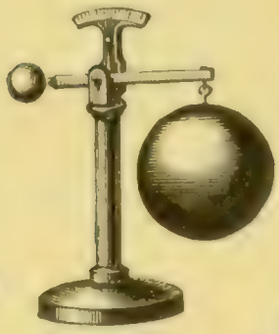
1755 **Apparatus for Demonstrating the Pressure of the Atmosphere,** with Weights complete £2 12 6



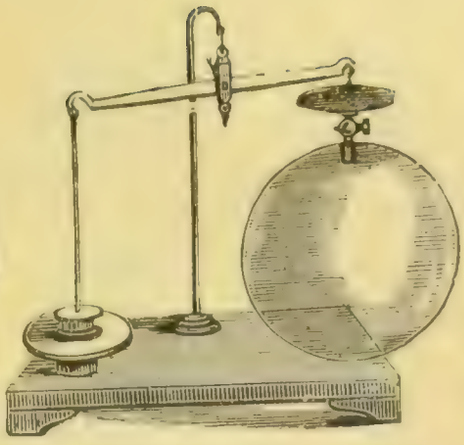
1756



1757



1757A



1758

1756 **Bacchus Experiment,** to illustrate the Elasticity of the Atmosphere £1 10 0

1757 **Baroscope,** with Cork Ball and Weight 0 7 6

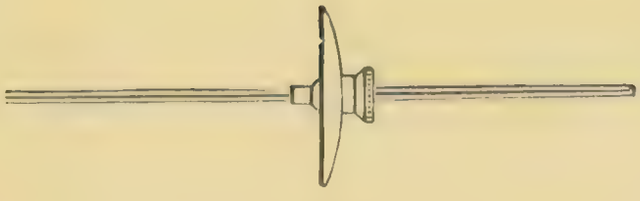
1757A ,, with Glass Ball and Brass Weight 0 14 6

1758 **Glass Globe,** fitted with Stopcock and Plate, Balance on Mahogany Stand, with Counterpoise for weighing Gases, &c. 0 19 0

Balloons, Gold Beaters' Skin and Collodion (*See page* 28).



1759



1760



1760A

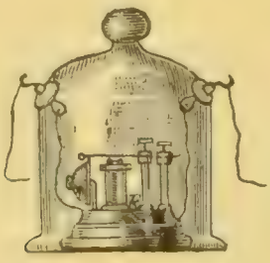
1759 **Light Glass Flask,** capacity about 500 c.c., fitted with Brass Stopcock and Hook, and extra Brass Screw for attaching to Air Pump, for estimating Specific Gravity of Gases, &c., with Connector £0 6 0

1760 **Barometer Tube and Collar** 0 7 6

1760A **Glass Receiver,** for Torricellian Experiments, 36 in. high ... 0 16 6



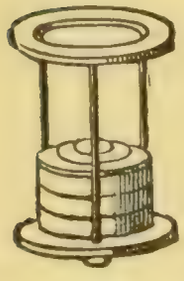
1761



1763

1761 **Bell Experiment,** for illustrating that Air is essential to Sound, for use with Air Pump ... £0 5 0

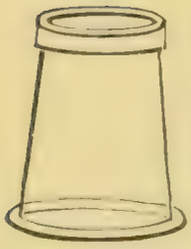
1763 ,, ,, to be rung by Electricity, with Receiver ... 1 12 0



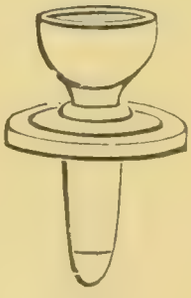
1764



1766



1765



1767



1767A



1767B

1764 **Bladder and Lead Weight** £0 7 0

1765 ,, **Glass** 0 1 0

1765A **Fruit or Apple Cutter** 0 2 6

1766 **Collar and Hook** 0 7 0

1767 **Filtering Cup** or Mercurial Shower ... ... 2/6 and 0 4 6

1767A ,, **Tube,** to show Poroscity of Wood 0 7 0

1767B ,, ,, Double Cylinder, with Porous Centre ... 0 12 0

1767C **Bladders,** India Rubber, for showing Elasticity of Air, per doz. 0 1 0


1768


1769

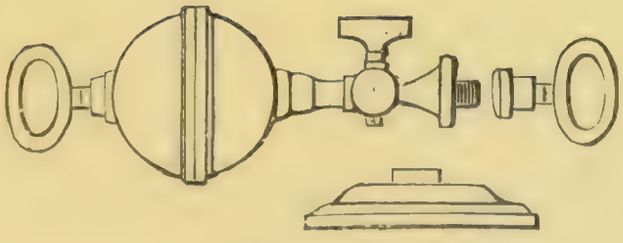

1771


1772


1772A

1768 **Fountain in Vacuo** £0 4 6
1769 „ „ Hero's, with Metal Basin 0 5 6
1770 **Fruit and Taper Stand** 0 1 9
1771 **Guinea and Feather Experiment** ... 2 falls, 16/; 3 falls 1 0 0
1772 „ „ „ Tall Glass Receiver for do., 16 × 3 top × 4 in. bottom 0 6 0
1772A **Long Glass Tube**, with Stopcock, about 36 × 1½ in. ... 0 12 6

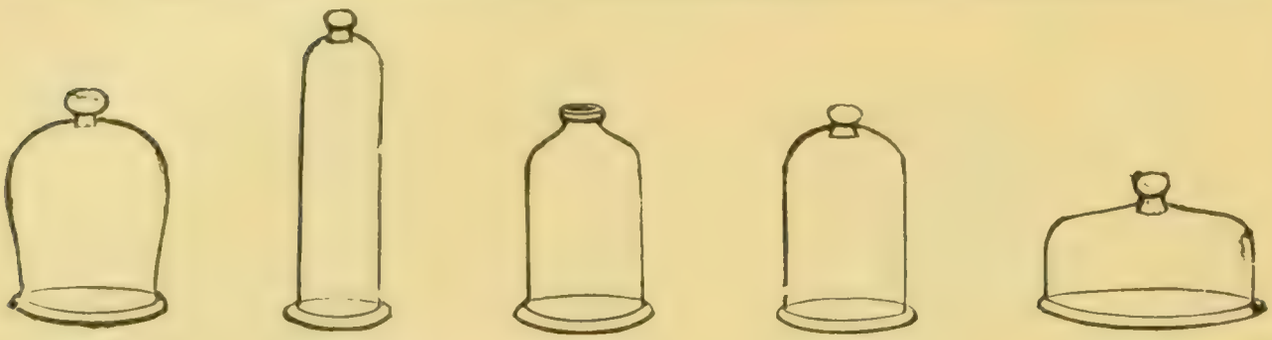

1773


1774


1777


1779

1773 **Lunge's Glass**, with Rubber Bladder £0 5 0
1774 **Magdeburg Hemispheres**, Brass, accurately ground—
Diam. 2½ in. 0 12 6
„ 3¼ „ 0 15 6
1775 „ „ Iron „ „ 3¼ „ 0 8 0
„ 4¼ „ 0 10 6
1776 **Manometer** 0 17 6
1777 „ with Compressed Air 1 15 0
1778 **Model of Diving Bell** 1 7 6
1779 **Plate and Hook**, Brass 0 3 0



1780 1781 1782 1783 1784

1780 **Receivers for Air Pump,** with knob at top and welt at bottom, accurately ground—

Height to Shoulder	7	7	8	9	10 in.
Diameter Outside	5	$5\frac{3}{4}$	7	8	9 in.
	2/	3/	3/6	5/6	7/6

1781 **Receivers,** Tall, with knob, and welted—

Height to Shoulder	9	10	12 in.
Diameter Outside	4	4	5 in.
	1/6	2/	3/

1782 **Receivers,** Open, welted top and bottom, accurately ground—

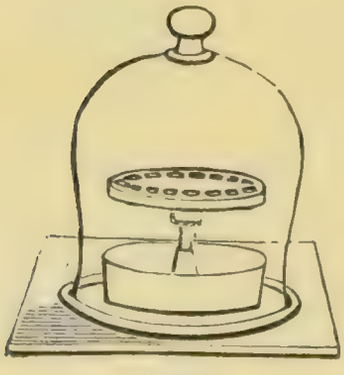
Height to Shoulder	7	7	8	9 in.
Diameter Outside	5	$5\frac{3}{4}$	6	7 in.
	2/	2/6	3/	4/6

1783 **Receivers—**

Height to Shoulder	7	7	8	9 in.
Diameter Outside	5	$5\frac{3}{4}$	$6\frac{1}{2}$	8 in.
	2/	2/6	3/	5/

1784 **Receivers,** Shallow, also used as Desiccating Covers—

Height to Shoulder	4	4	4	5 in.
Diameter Outside	6	$6\frac{1}{2}$	7	8 in.
	1/6	1/9	2/	2/9



1786



1787

1785 **Porcelain Sulphuric Acid Dish,** with perforated wooden table to fit the pan, for funnels, capsules, &c.—
Diameter of pan 5 in. £0 2 6

1786 „ With ground glass plate and cover, complete ... 0 7 6

1787 **Porcelain Sulphuric Acid Dish,** with partitions for the support of capsules under a Glass Receiver—

Dresden, $4\frac{1}{8}$ in. diameter	£0	2	0
„ $4\frac{7}{8}$ „ „	0	2	6

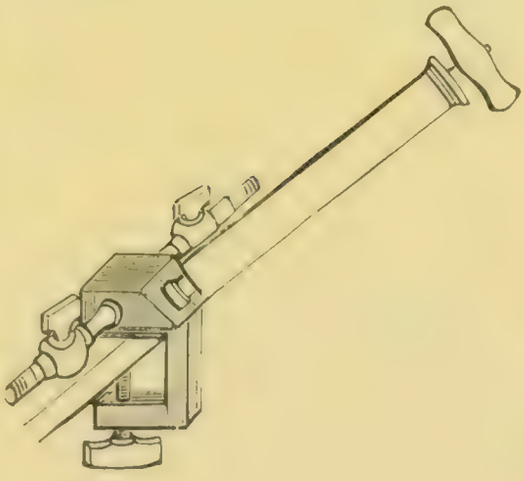
(*See also Drying Apparatus, page* 79.)



1788



1788A



1790



1791



1792

1788 **Brass Syringe,** Exhausting or Condensing—

Length of Cylinder 5 in., diameter 1 in.	£0	7	0
„ „ 7 „ „ $1\frac{1}{4}$ „	0	10	6
„ „ 8 „ „ $1\frac{1}{2}$ „	0	13	6

1788A „ „ Exhausting or Condensing, cheaper make, $7 \times 1\frac{1}{2}$ in. 0 6 0

1789 „ „ Exhausting and Condensing—

Length of Cylinder 5 in., diameter 1 in.	0	9	0
„ „ 7 „ „ $1\frac{1}{4}$ „	0	12	6
„ „ 8 „ „ $1\frac{1}{2}$ „	0	15	0

1790 „ „ Exhausting and Condensing, $8 \times 1\frac{1}{4}$ in., with Clamp to fit to Table, for Organic Analysis 1 7 0

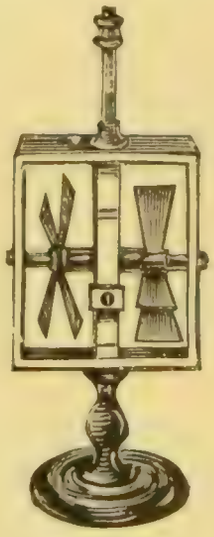
1791 **Tallow Holder,** Mahogany, with Screw, for Greasing Edges of Glass Receivers, &c., previous to use with Air Pump, 1/3 & 0 1 6

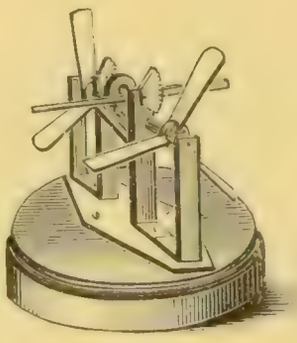
1792 **Breaking Squares** ... ... per doz. 0 6 0

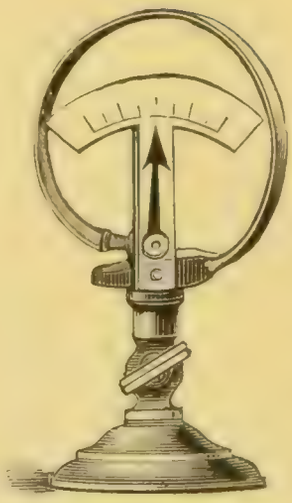
1792A **Wire Cage** for covering Breaking Squares ... each 0 4 0


1795


1796B


1798

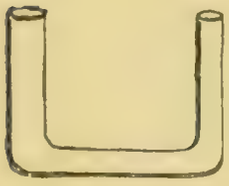

1798A

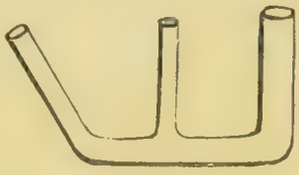

1798B

1795	**Vacuum Gauge**	£0	3 3
1796	,, ,, Arm for	0	3 0
1796A	,, ,, ,, with Brass Plate	0	5 6
1796B	,, ,, with Boxwood Scale enclosed in Glass Tube, and Stopcock, complete	0	8 6
1798	**Windmill,** with Shifting Vanes, to show the resistance of air	1	17 6
1798A	,, ,, ,, ,,	1	5 0
1798B	**Bourdon's Ring,** with Stopcock, for showing the action of Metal Barometers and Manometers	1	0 0

(Set of Air Pump Apparatus, see Cheap Sets at end of Catalogue.)

HYDROSTATICS AND HYDRAULICS, &c.

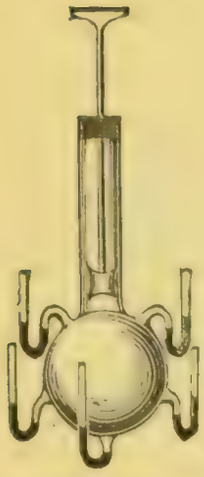

1803


1804

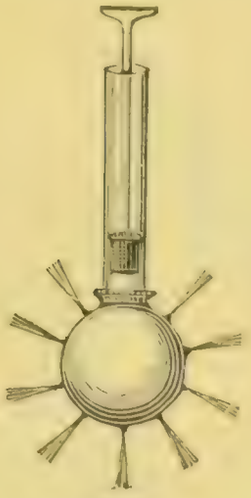

1805


1805A

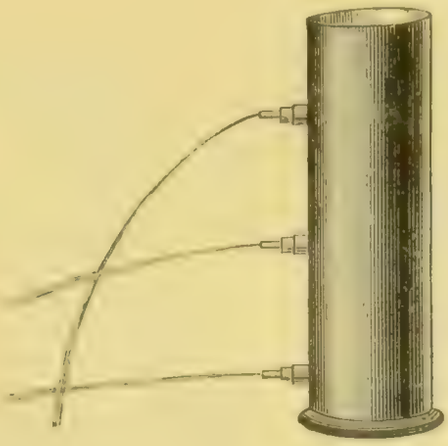
1803	**Apparatus, Glass,** with two Branches, to show that water rises to a level in Communicating Vessels ...	£0	1 0
1804	,, ,, with three Branches	0	1 3
	,, ,, mounted on Wood Stand	0	2 3
1805	,, ,, with five Branches	0	5 0
1805A	,, ,, Spirit Level, Brass, 4 in.	0	2 0



1806



1807



1807A



1807B

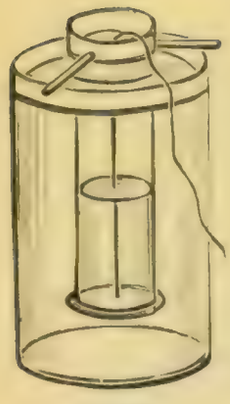
1806 **Apparatus, Glass,** to show equal pressure of Gas ... £0 6 0

1807 ,, ,, ,, ,, Fluid ... 0 5 6

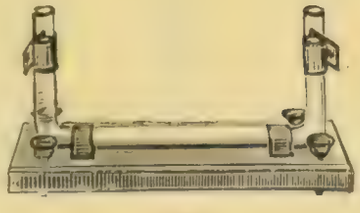
1807A **Spouting Jar,** 20 × 6 in., Japanned Tin, for demonstrating Torricelli's Experiment, fitted with Tubes and Corks ... 0 5 6

1807B **Archimedes' Apparatus,** for demonstrating Specific Gravity, Brass Cylinder, with Bucket .. 0 6 0

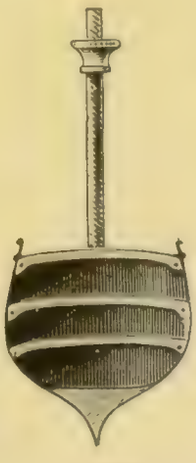
1807C ,, , Cardboard Cylinder, for attaching to Beam of Balance for comparing the weight of Hydrogen and Carbonic Acid Gas ... 0 0 6



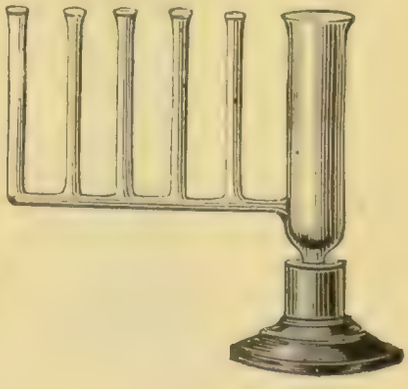
1808



1809



1809A



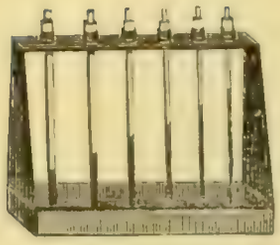
1810

1808 **Apparatus to illustrate Upward Pressure of Water,** consisting of a Glass Cylinder, open at both ends, with Metal Disc, and Cord attached to close the bottom of the Tube, and outer Glass Jar to contain Water... ... £0 3 6

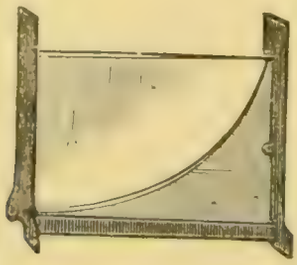
1809 **Water Level Apparatus,** on Mahogany Stand, with Brass Fittings and Levelling Screws 0 14 6

1809A **Model of Vessel,** with Moveable Weight on Mast, to show stability ... ... each 0 10 0

1810 **Water Capillarity Vessel,** with six Tubes 0 2 6



1810A



1810B



1810C

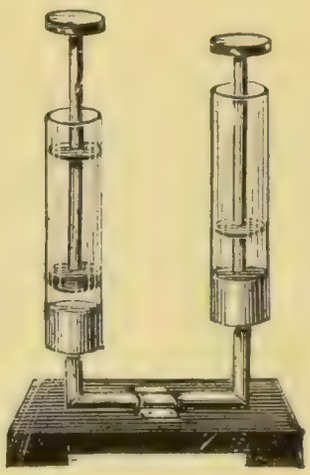
1810A **Tubes,** Set of six, of different Bores, in Japanned Zinc Frame, for showing Capillary Attraction... ... ... £0 2 3

1810B **Pair of Capillary Glass Plates,** mounted in Japanned Zinc Frame 0 2 3

1810C **Pair of Glass Adhesion Plates,** with Handles, diam. $3\frac{3}{4}$ in. 0 2 0



1812

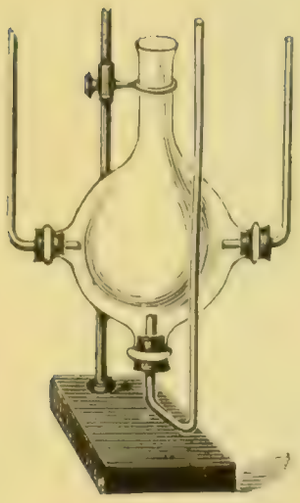


1813

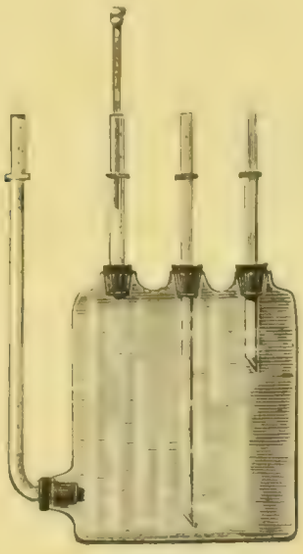
1811 **Communicating Vessel,** U form, with two Limbs of unequal diameters, 16 in. long £0 2 6

1812 „ mounted on Mahogany Stand, with Scale ... 0 6 0

1813 **Apparatus to show Pressure of Water,** consisting of two Glass Cylinders $1\frac{1}{8}$ in. diameter, with Metal Discs, mounted on Mahogany Stand 0 8 6



1814



1814A



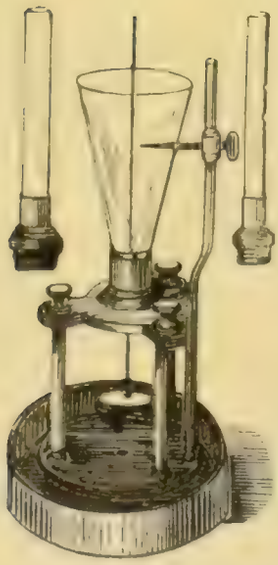
1815

1814 **Glass Globe,** about 8 in. diameter, fitted with Tubes, on Iron Stand, with two Rings, to show Pressure of Water in all directions £1 5 0

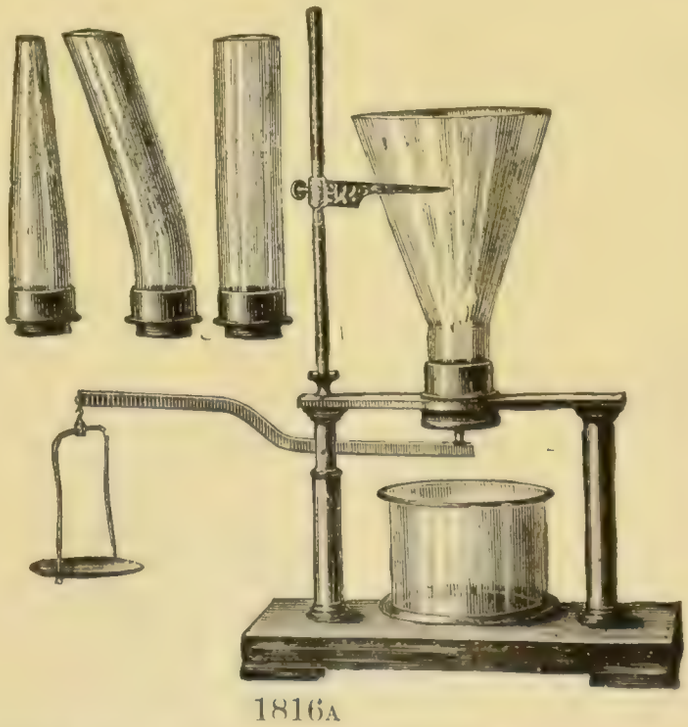
1814A Another form 0 12 0

1815 **Glass Globes,** about 6 in. diameter, fitted with Brass Caps, two Stopcocks, and Connector, to show the Pressure of Mixed Gases 0 12 0

Iron Stand, with Clamps, for above 0 7 6



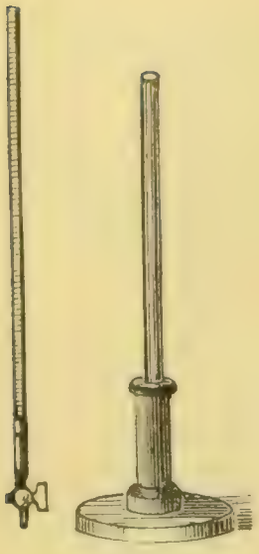
1816



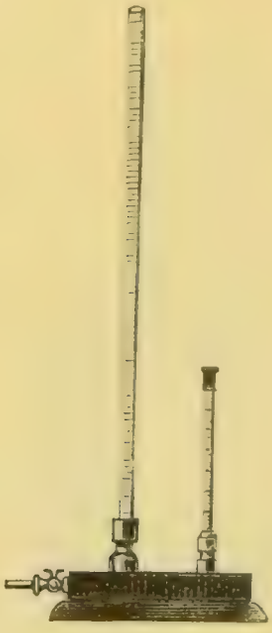
1816A

1816 **Pascal's Apparatus,** to show that the pressure exercised by a liquid on the bottom of a vessel depends exclusively on the dimensions of that bottom, and on the height of the column of liquid it supports, consisting of three Glass Vessels of different forms, open at both ends, mounted with Brass Screws, Brass Stand, and Trough, complete £2 2 0

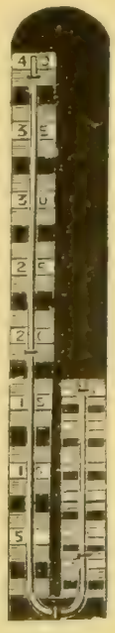
1816A Ditto with four different Tubes, mounted on Mahogany Base 3 3 0



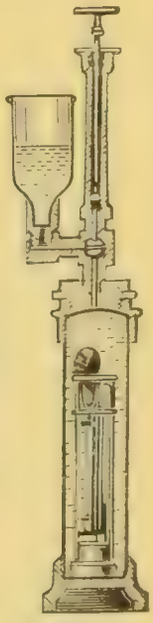
1817



1818



1818A



1818B

1817 **Mariotte's Apparatus,** to show that under pressure air expands to twice its ordinary volume. Graduated Tube and Stopcock, and Tube 24 × ¾ in., with Stand ... £0 12 0

1818 **Mariotte's Apparatus,** to show that under compression of two atmospheres air is compressed into half its ordinary bulk ; two Graduated Tubes and Metal Fittings ... 0 18 0

1818A **Boyle's Tube,** on Board, with Scale... ... ... 0 5 0

1818B **Oersted's Apparatus,** for showing the compressibility of Liquids 9 0 0



1819



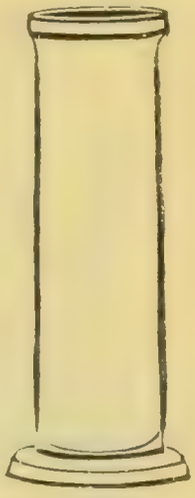
1820



1821



1822



1823

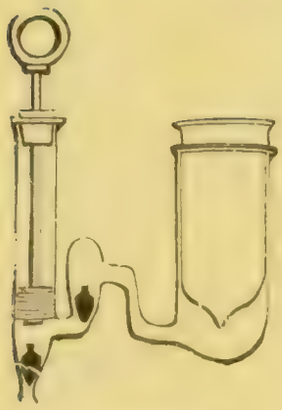
1819 **Cartesian Figure** £0 0 5

1820 ,, ,, ... 0 0 5

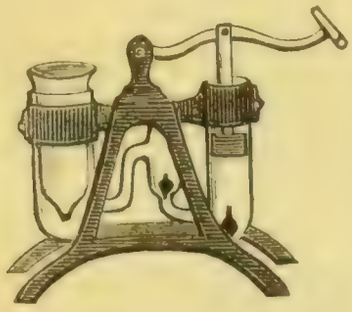
1821 ,, ,, in cage 0 0 9

1822 ,, ,, ,, ... 0 0 9

1823 **Tall Glass** for ditto, with India Rubber Sheet 0 0 10



1824

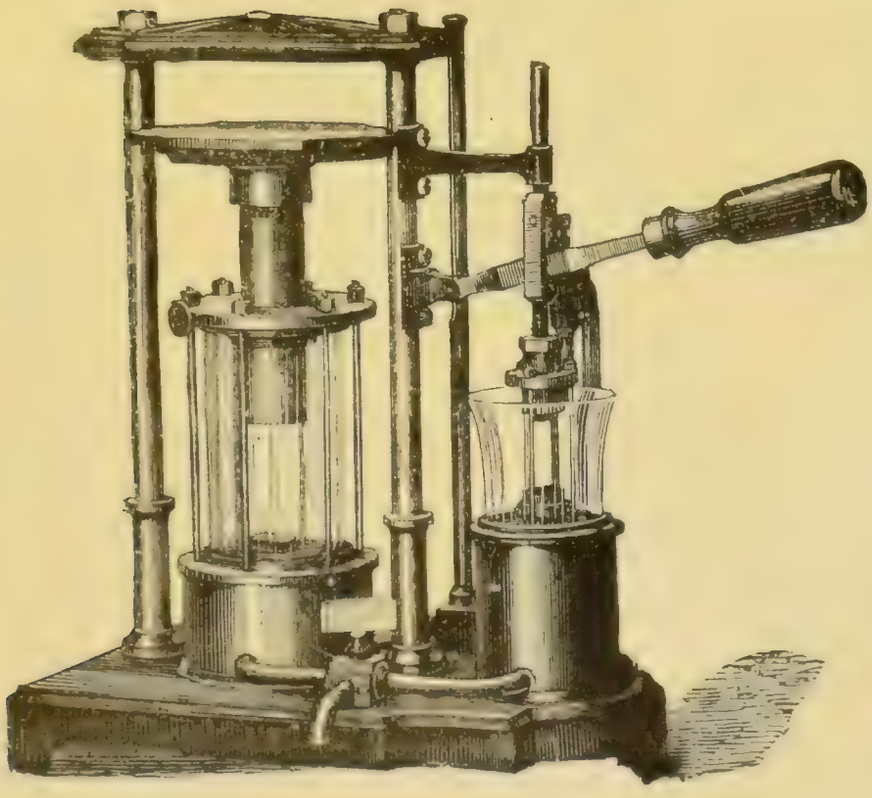


1825

1824 **Hydrostatic Press** £0 3 0

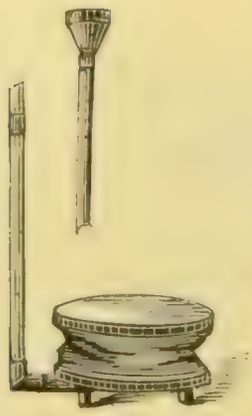
1825 ,, ,, with Brass Fittings, on Iron Stand ... 0 12 6

1827 ,, ,, Bramah's, Metal, with three moveable Knife Edges for Breaking Metal Bars, worked by a Lever 5 0 0

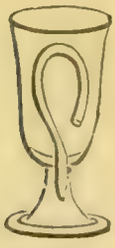


1827A

1827A **Hydrostatic Press,** with two strong Glass Cylinders, to show the working of the Pump, mounted on Mahogany Base ... £7 10 0



1828



1829



1830

1828 **Hydrostatic Bellows,** with Circular Board 12 in. diam., and Metal Side Tube, with Funnel 6 ft. high £1 5 0

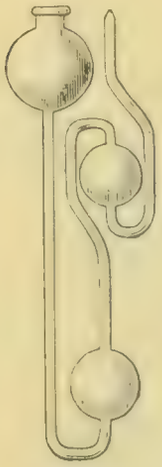
1828A ,, ,, best quality Rubber, with strong Brass Fittings and Mahogany Boards ... 3 0 0

1829 **Tantalus Cup,** with Curved Syphon... ... ... 0 1 6

1830 ,, ,, ,, Painted Figure... ... ... 0 10 6



1831



1831A



1831B



1831C

1831 **Hero's Fountain,** on Glass Foot £0 5 6

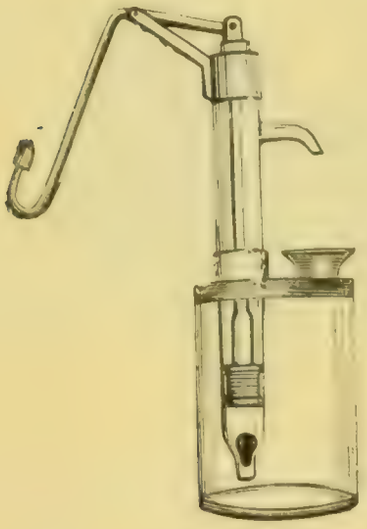
1831A ,, ,, unmounted 0 2 6

1831B ,, ,, with two stout Glass Balls, Brass Basin, and Fittings, mounted on Iron Foot, best finish 2 2 0

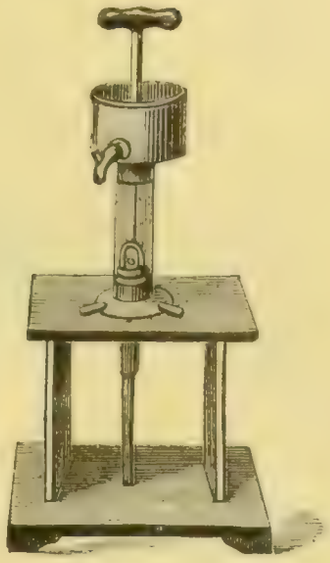
1831C **Intermittent Fountain** 0 3 0



1832



1833



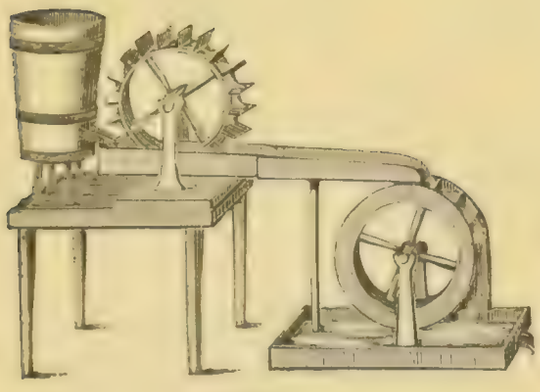
1834

1832 **Model Glass House Pump** £0 3 0

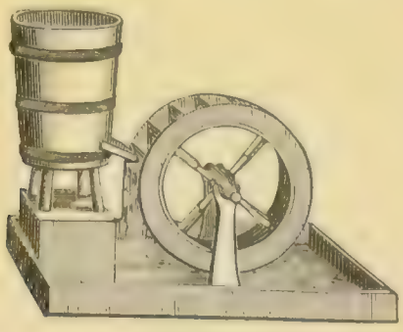
1833 ,, **House Pump,** with Glass Cistern, Japanned Tin Cover, Brass Handle, and Fittings, Barrel about 8 in. × 1 in. 0 8 0

1834 ,, ,, ,, on Mahogany Stand, Glass Barrel, 8 in. × 1¼ in. diameter, and Brass Fittings, superior make... ... 1 0 0

1835 ,, ,, ,, Brass, with Glass Barrel, as above, unmounted 0 12 6



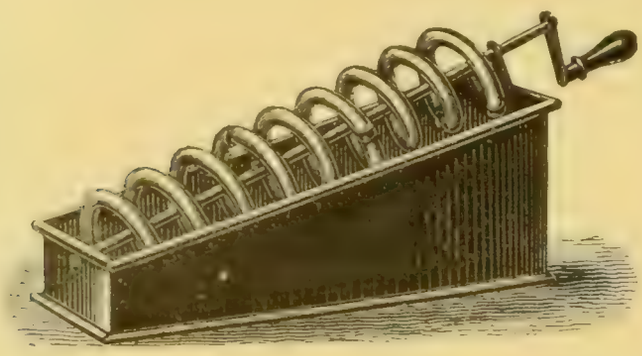
1835A



1835B

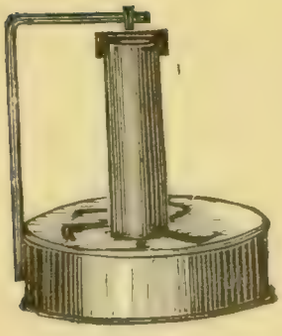
1835A **Waterwheels,** Overshot and Undershot, Japanned Tin, Wheels 8½ in. diameter, mounted on Stand complete £1 11 6

1835B ,, Undershot only, mounted on Stand ... 0 16 6

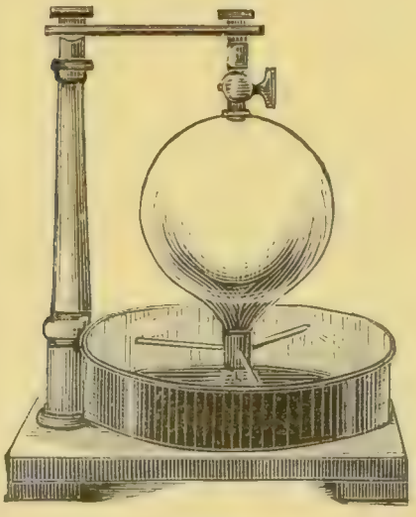


1835c

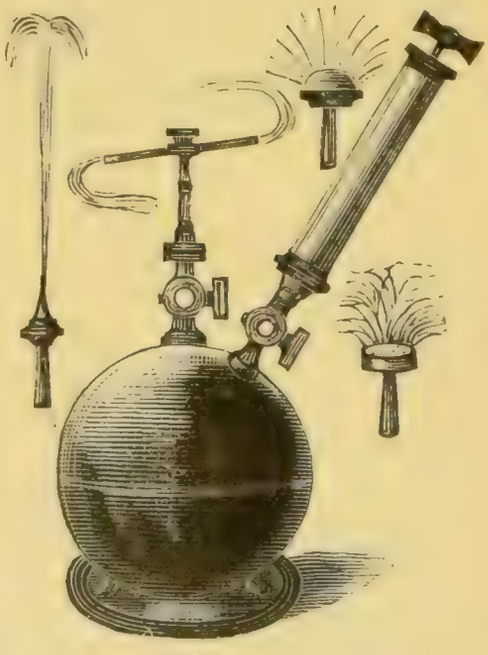
1835c **Archimedean Screw** with Glass Spiral mounted on Japanned Tin Cistern £0 15 6



1836



1838



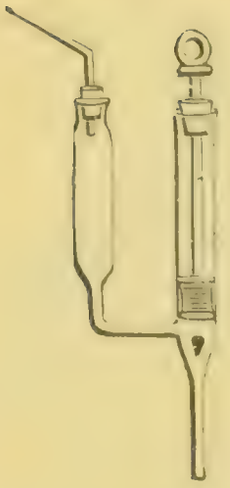
1839

1836 **Barker's Mill,** for showing Lateral Pressure of Liquids, Japanned Tin, Cistern 8 in. diameter, with 4 Jets £0 6 6

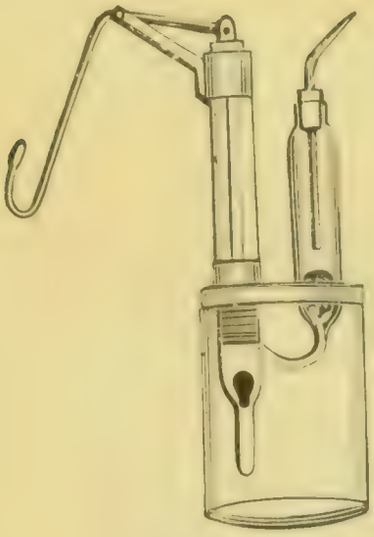
1837 ,, ,, Brass Cylinder, 13 in. × $1\frac{7}{8}$ in., Trough 13 in. diameter 1 1 0

1838 ,, ,, (Tourniquet), Pear Shaped, Glass Vessel, Mounted with Brass Caps and Stopcock on Polished Mahogany Base, Cistern 14 in. diameter 2 2 0

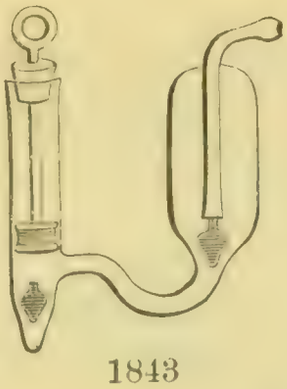
1839 **Condensed Air Fountain,** Stout Copper Ball, Japanned, well finished, with Brass Syringe and 4 Jets, complete ... 2 2 0



1840

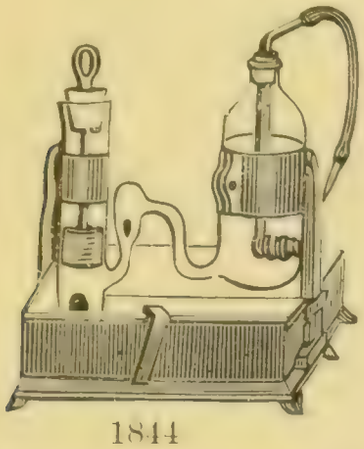


1841

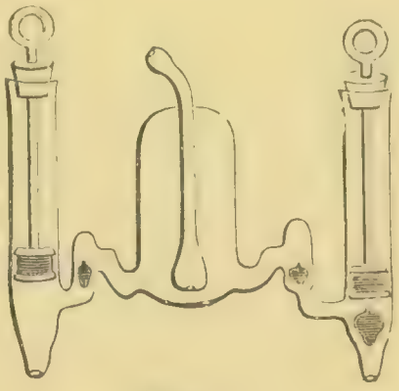


1843

1840	**Model Force Pump**	£0	3	6
1841	,, ,, with Glass Cistern and Japanned Tin Cover	0	8	0
1842	,, ,, Brass, Glass Barrel, similar to Fig. 1834	1	10	0
1843	,, ,, Single action	0	3	6

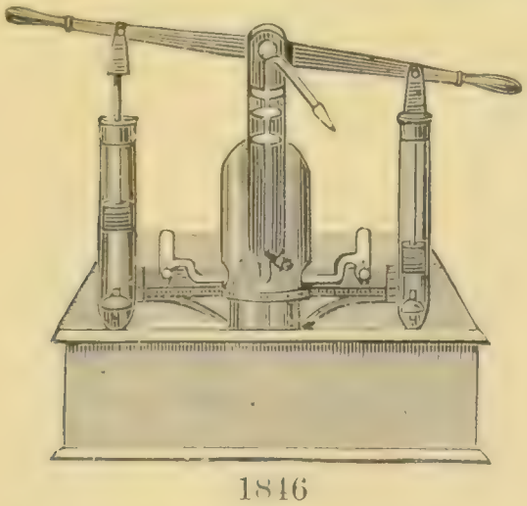


1844

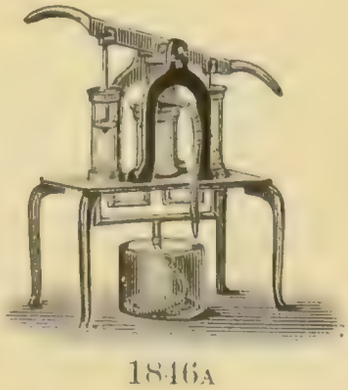


1845

1844	**Model Force Pump,** with India Rubber Tube, and Glass Jet, on Japanned Tin Cistern ...	£0	12	6
1845	,, ,, Double, unmounted	0	6	0



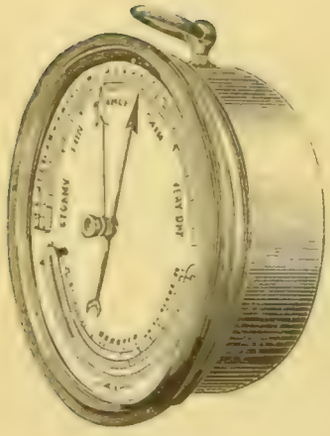
1846



1846A

1846	**Model Force Pump,** Double Barrel, or Fire Engine, with Brass Fittings, on Japanned Tin Cistern ...	£0	17	6
1846A	,, ,, ,, best make, and mounted on Bronzed Iron Stand	1	10	0

BAROMETERS.



1848



1851

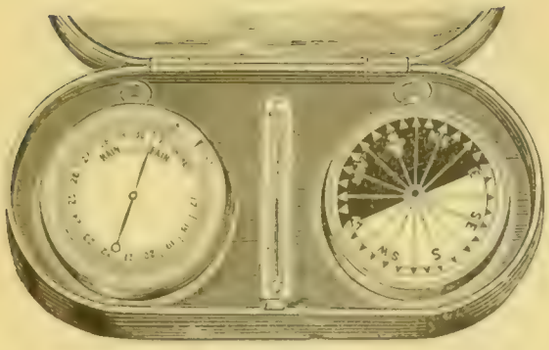


1854

1847	**Barometer, Aneroid,**		Hard Enamel Dial, 5 in. diameter, in Brass Case, with Straight Thermometer, best quality, in velvet lined Box	£1	0	0
1847A	,,	,,	Same as above, second quality make...	0	14	6
1848	,,	,,	Silvered Dial, 5in. Curved Thermometer, best quality, in velvet lined Box ...	1	7	6
1849	,,	,,	Enamelled Card Dial, with Fitzroy Indication, 5 in. diameter, Curved Thermometer, best quality ...	1	5	0
1850	,,	,,	Do. do. $6\frac{1}{2}$ in. diameter do....	1	10	0
1851	,,	,,	Do. Open Face, 5 in. diameter, Enamelled Dial, without Thermometer	1	2	6
1852	,,	,,	Do. do. Silvered Metal Dial, 5 in. diameter	1	7	6
1853	,,	,,	Do. do. 5 in. diameter, Curved Thermometer	1	8	6
1853A	,,	,,	Do. do. $6\frac{1}{2}$ in. diameter ...	1	10	0
1854	,,	,,	Watch form, Gilt Cases, Hard Enamelled Dial, best quality, $1\frac{3}{4}$ in. diameter, in Morocco Case ...	1	12	6
1855	,,	,,	Altitude 8,000 feet, Silvered Metal Dial	2	0	0
1856	,,	,,	Do. do. with Thermometer ..	2	2	0
1857	,,	,,	Do. do. with keyless action to Altitude Scale	2	17	6
1858	,,	,,	Do. do. with Singer Pearl Dial Compass and Thermometer ...	3	3	0



1859



1866

1859 **Barometer, Aneroid,** Altitude 8,000 ft., in Hunter Case, keyless action, in Leather Bag ... £3 3 0

1860 *Extras*—**Compensation for Temperature** 0 5 0

1861 „ **Altitude Scales,** if made to revolve 0 2 6

1862 „ „ „ to 10,000 ft., beyond prices quoted for 8,000 0 4 6

1863 „ „ „ 12,000 ft. „ „ 0 6 6

1864 „ „ „ 16,000 ft. „ „ 0 8 6

1865 „ „ „ 20,000 ft. „ „ 0 10 6

Keyless Action, where not specified, *extra* 8/6.

1866 **Watch Form Aneroid Barometer Set,** consisting of Watch Form Aneroid to 8,000 ft., Ivory Scale Thermometer and Bar Needle Compass, in Morocco Case 3 7 6



1867



1868

1867 **Watch Form Aneroid Barometer,** Oval Pocket Set, as above, with full size Watch Form Compass £3 7 6

x 2

1868 **Special Surveying and Mining Aneroid Barometer,** Compensated, giving readings to single feet of altitude, for use of Surveyors and Engineers. Scale of Altitude admits of sub-division by Vernier Scale, will register 2,000 ft. below sea level to 4,000 ft. above. Altitude Scale represents 10 ft. divisions, which can be sub-divided by Vernier to single feet. Stout Bronzed Metal Case, Silvered Dial, Vernier Scale, Rackwork Motion, Reading Lens arranged to traverse the entire circle, Altitude Scale 6,000 ft., compensated for Temperature, in Sole-Leather Sling Case. Diameter 3½ in. £6 0 0

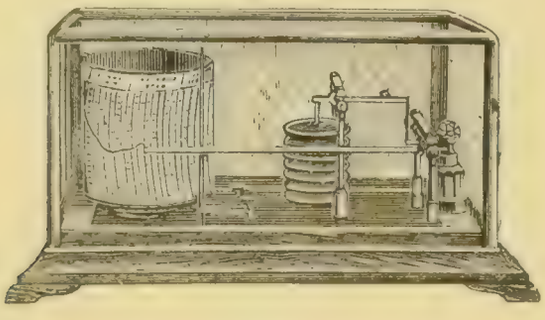
1869 ,, ,, 5 in. diameter, giving more open divisions 6 6 0

1870 ,, ,, ,, altitude to 10,000 ft. ... 6 10 0

1871 ,, ,, ,, ,, 15,000 ft. ... 6 15 0

1872 ,, ,, ,, ,, 20,000 ft. ... 7 0 0

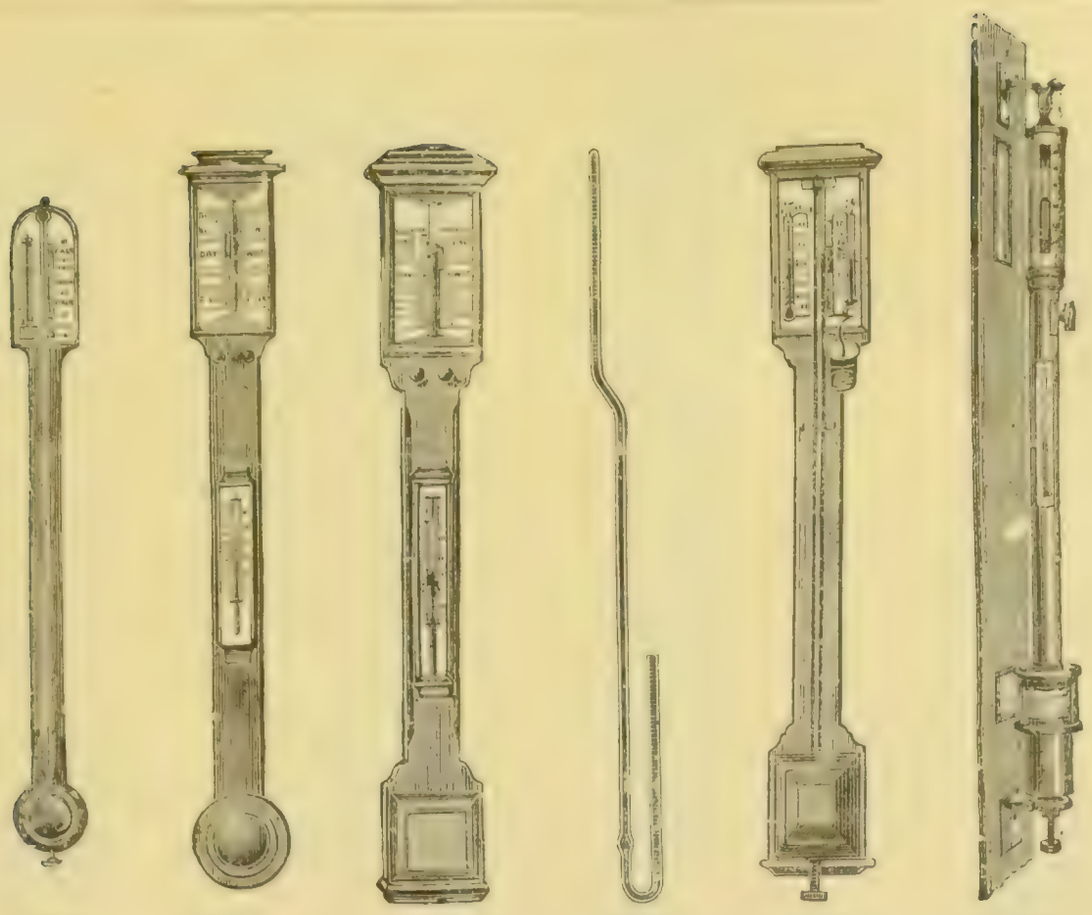
Other descriptions of Aneroid Barometers, in Carved Wood Frames, supplied to order.



1872A

1872A **Barograph, or Self-Recording Barometer.** This Instrument will record the variations of the atmospheric pressure for seven days without attention, when it is only necessary to replace the Paper Chart. Fitted in Polished Mahogany Case with Glass Front, and a sufficient number of Charts for one year, complete £5 5 0

1872B **Thermograph,** for recording the variations of Temperature... 5 5 0



1873 1874 1875 1873D 1875B 1878

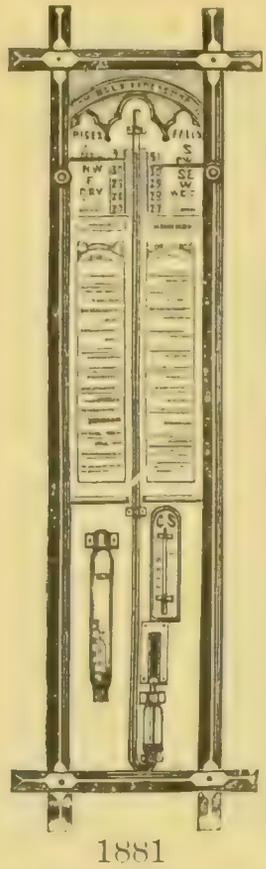
1873	**Model Barometer,** Ivory Scale, with Thermometer, Sliding Vernier, Portable Screw, and Polished Mahogany Frame	£0	17	6
1873A	,, ,, Stouter Tube, better finish... ...	1	1	0
1873B	**Barometer, Pediment,** with 1 Vernier enclosed Tube ...	1	12	6
1873D	,, Bunsen's Syphon, graduated into millimetres, filled with Mercury	0	13	6
1873E	Iron Stand and Clamp for ditto	0	7	6
1874	**Barometer, Pediment,** Square Top, Broad Double Scale, Double Vernier, in Polished Wood Case, with Thermometer ...	3	3	0
1875	,, ,, Square Top, Sea Coast, Double Scale, Double Vernier, in Polished Wood Case, Opal Glass Scale, and Thermometer	4	5	0
1875A	,, ,, Larger and superior make ...	4	10	0
1875B	**Barometer for Agricultural Purposes,** Ivory Scale, Sliding Vernier, Wet and Dry Bulb Hygrometer, in Polished Oak Frame	1	15	0
1875C	,, Larger bore	2	7	6
1875D	**Barometer, Marine,** stout Brass Body, mounted on gimbals, with Vernier reading to $\frac{1}{500}$th in., with Opal Glass Scales	4	10	0
1878	**Standard Barometer** (Fortin's principle), Glass Cistern, with Vernier for very accurate reading, stout Bronzed Frame on Polished Mahogany Board, with delicate Thermometer— Inside diameter of Tube ·30 in.	7	10	0
	·50 ,,	7	15	0
	With Kew Certificates extra	0	10	6



1879



1880



1881



1882

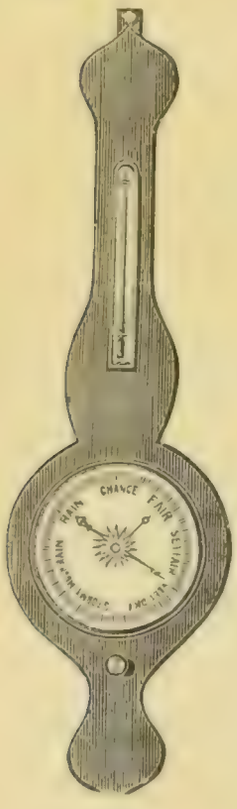
1879 **Mountain Barometer,** on Fortin's principle, enclosed in Brass Body, Double Vernier, giving correct readings to $\frac{1}{500}$th in., on Tripod Stand, with Leather Case, complete £7 15 0

1880 **Miner's or Pit Barometer,** open face, on Solid Oak Frame, screwed with Thermometer and Rack and Pinion Vernier, recording to 33 in., stout Brass Rim to Glass Front ... 1 12 6

1881 **Fitzroy Barometer,** in plain Oxford Frame, with sliding Index 0 16 6

1882 „ „ Carved Top 1 7 6

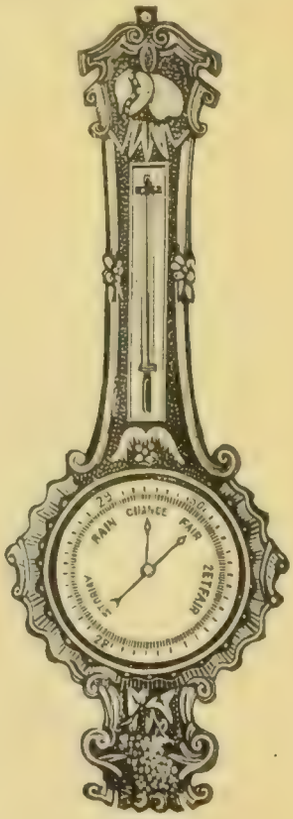
1883 „ „ Carved Gothic, best finish, £1/15/ and 3 3 0



1883A



1883B



1883C

1883A **Wheel Barometer,** in plain Wooden Frame, Silvered Metal Dial, 8 in. diameter £1 1 0
1883B ,, ,, 10 in. diameter 1 10 0
1883C ,, ,, in Polished Carved Wooden Frame, Thermometer, and Silvered Dial 8 in. diameter 3 0 0
1883D ,, ,, 10 in. diameter 3 10 0



1885

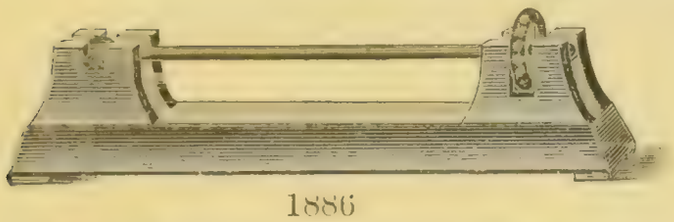
1884 **Barometer Tube,** Plain, closed one end 0 0 9
1885 ,, ,, with Bulb 0 1 0
1885A **Compass,** Stout Brass, with Pull-off Cover, Enamelled Card Dial, Blued Needle, Bevelled Glass—

Diameter	$1\frac{1}{2}$	$1\frac{3}{4}$	2 in.
	2/9	3/	3/6 each

1885B ,, With Jewelled Caps and Stops, 1/ each extra.
1885C ,, Military, in strong Metal Hunter Case, Silvered Metal Dial, Jewelled Cap and Stop—

Diameter	$1\frac{1}{2}$	$1\frac{3}{4}$	2 in.
	12 6	16 6	17/6 each

HEAT EXPERIMENTS.



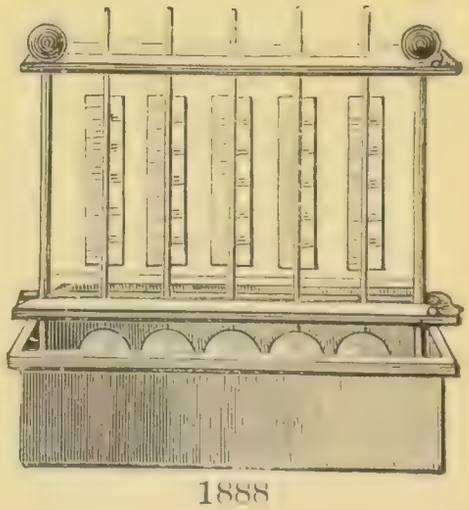
1886



1886A



1887

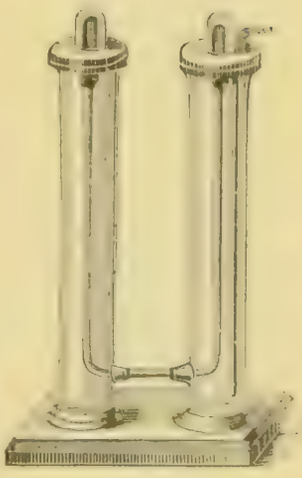


1888

1886 **Apparatus** to show the force of contraction or expansion of solids, with 12 Bars to be broken ... £0 8 0
1886A ,, best finish, for contraction or expansion, with Gas Burner complete... ... ... 0 14 0
Bars, Cast Iron, for ditto... ... ... per doz. 0 1 0
1887 **Apparatus** to show the conductivity of Metals 0 3 6
1888 ,, to show the difference of expansibility of Fluids, consisting of a set of 5 Bulb Tubes, with Boxwood Scales, graduated in $\frac{1}{10}$th in., Japanned Trough to hold hot water, and Brass Supports 1 0 0



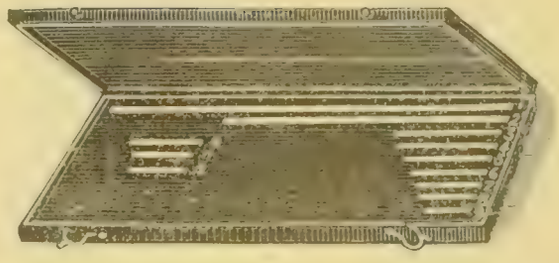
1888A



1888B



1888C



1888D

1888A **Apparatus** to show the elasticity of Vapours, mounted on Stand, with 4 Barometer Tubes and Trough £1 0 0

1888B **Weinhold's Apparatus,** for demonstrating the coefficient expansion of Mercury 0 15 0

1888C **Centimetre Cubes,** set of 12 Zinc, Tin, Copper, Iron, Nickel, Silver, Lead and Alloys, Brass, Bronze, and Aluminium Bronze, numbered 1 to 12, with Reference Table, giving weight in grammes and Specific Gravity, fitted in Leather Case, complete 1 10 0

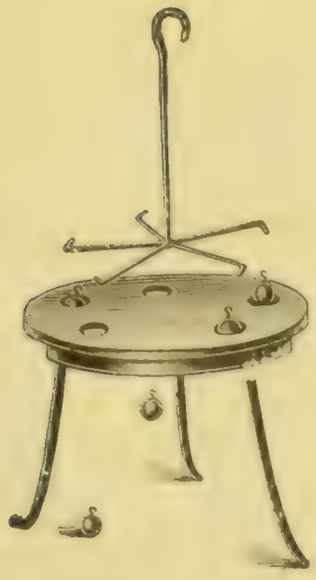
1888D ,, Rods of above Metals, 5 millimetres thick, each weighing 10 grammes, showing that the lengths are inversely proportional to the Specific Gravity, with Reference Table, in Leather Case, complete 1 15 0

1889 **Balls,** set of 5, different Metals 0 3 9

1890 ,, Copper, with Ring Handle, 5 lbs. 0 9 0

1891 ,, Iron, set of 5, 4 lbs. to $\frac{1}{4}$ lb. 0 5 6

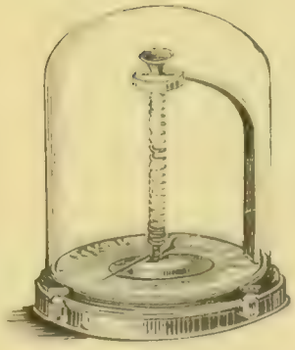
1892 Stand for ditto 0 1 3



1892A



1895A



1895B

1892A **Tyndall's Apparatus,** to show specific heat of different Metals, complete with 5 Balls of different Metals, Hook, Plate of Wax, and Tripod Stand £0 9 0

1893 **Cylinders,** Set of—Copper, Tin, Lead, Iron, Zinc, Brass, Cork, and Wood 0 6 6

1893A ,, with Bismuth 0 7 6

1894 **Bar,** Compound of Brass and Iron, 15 × 1¼ in., to show the curvature resulting from unequal expansion 0 6 0

1894A ,, ,, Smaller size, 9 × ¾ in. 0 2 0

1895 ,, ,, to show difference in conductivity of Metals ... 0 2 3

1895A **Compensation Pendulum,** 33 in. long, Brass and Iron alternately 1 7 6

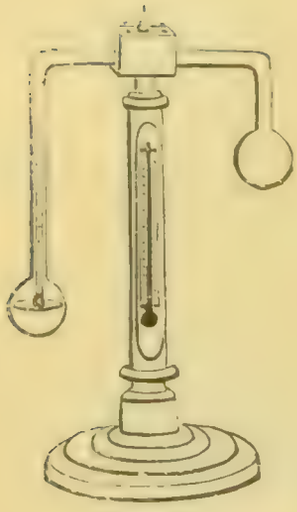
1895B **Metallic Thermometer** (Breguet's), Spiral, of 3 different Metals, Milk Glass Scale divided into degrees, mounted on Stand, with Binding Screws and Glass Shade, small 1 14 0

large 2 10 0



1896

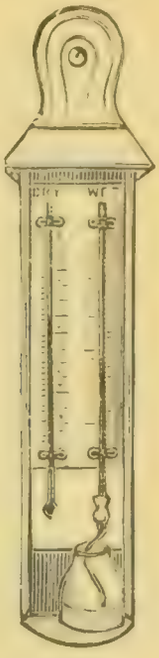
1896 **Wood and Brass Cylinder,** to show the different conducting powers of Brass and Wood 0 2 6



1897



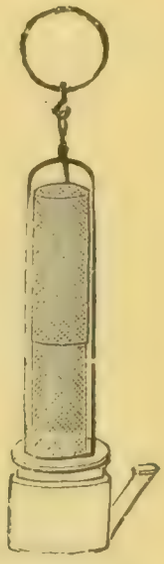
1897A



1898

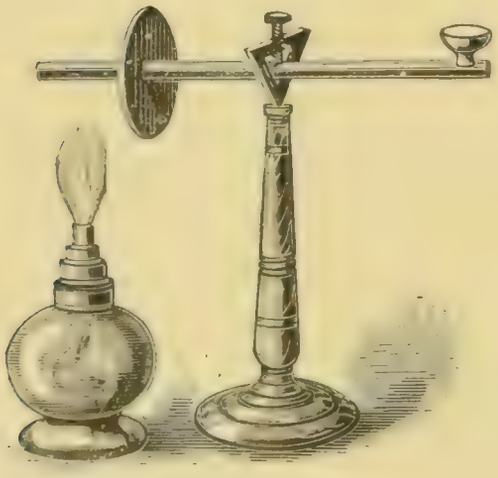


1898B

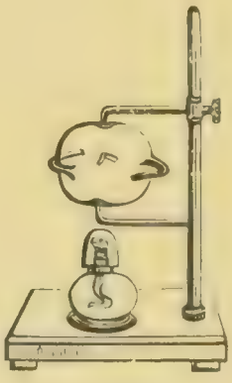


1899

1897	**Daniel's Hygrometer,** on Polished Wood Stand ...	£0	12 0
1897A	**Regnault's Hygrometer,** with Solid Silver Cup and Thermometer	0	5 6
1898	**Mason's Wet and Dry Bulb Hygrometer,** Boxwood Scale, in Japanned Frame, 10 in.	0	8 0
1898A	,, ,, ,, Zinc Scale	0	11 0
1898B	,, ,, ,, Simple form, for School use ...	0	5 6
1899	**Davy's Safety Lamp,** Japanned Tin Reservoir	0	8 6
	,, ,, Polished Brass	0	12 6



1901

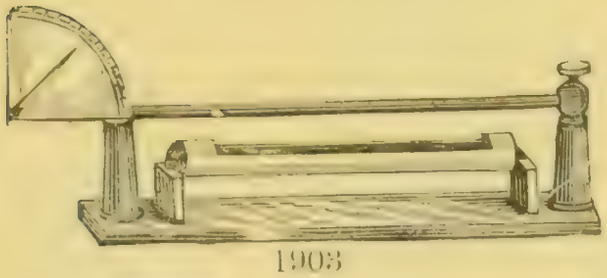


1902

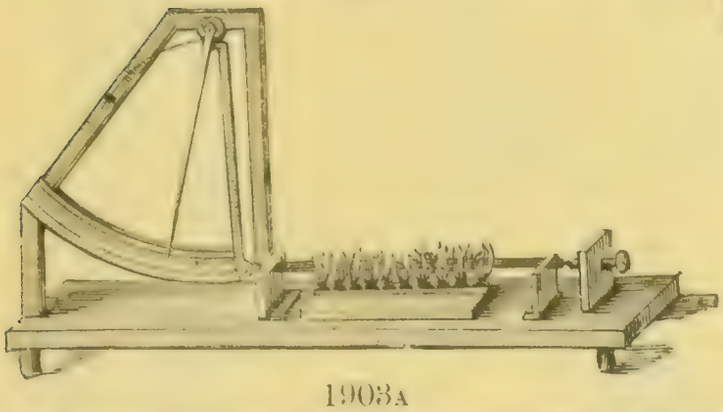


1902B

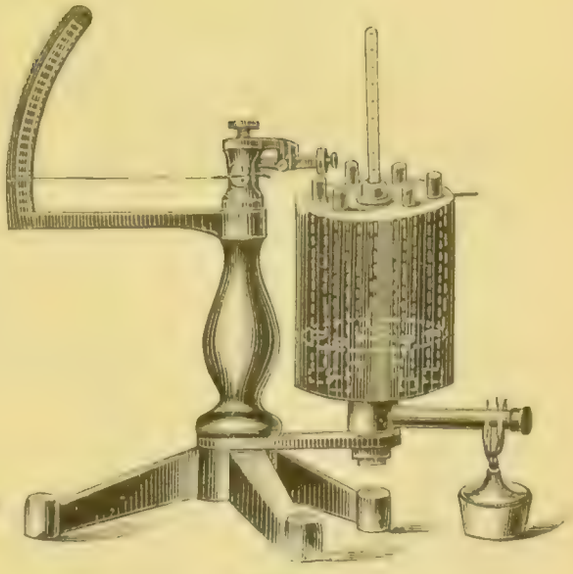
1901	**Depretz Apparatus,** for showing conductivity	£1	0 0
1902	**Eolipile, or Hero's Model Rotatory Steam Engine,** mounted on Stand, with Brass Rod, and Glass Spirit Lamp	0	6 6
1902A	Smaller form	0	4 0
1902B	**Hypsometer,** for determining different altitudes by observation of the boiling points of water, with Lamp and special Thermometer, complete	2	10 0



1903

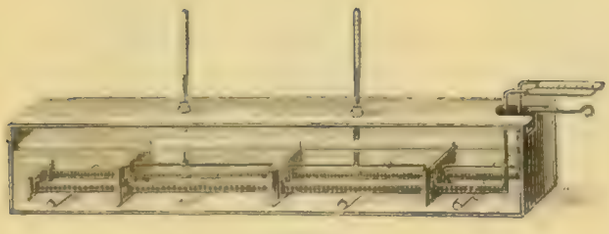


1903A

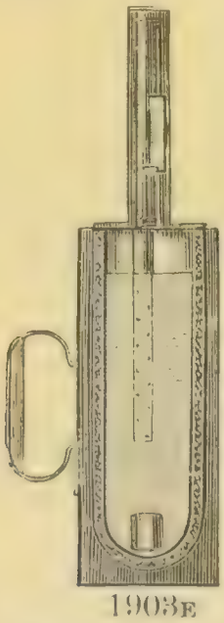


1903C

1903 **Ferguson's Pyrometer,** with 3 Rods of different Metals, to show expansion, with Brass graduated Arc ... £1/8/ and £1 12 6
Extra Bars for ditto ... ... each 0 1 9
1903A **Muschenbrock's Pyrometer** 1 15 0
1903B **Wedgwood's** ,, ... 1 13 0
1903C **Apparatus** for demonstrating the expansion of different Metal Rods. The Rods are fixed at the bottom of Revolving Cylinder and are so arranged that at a known temperature they are all the same length, which is indicated by the Pointer on the Scale standing at zero 4 10 0



1903D

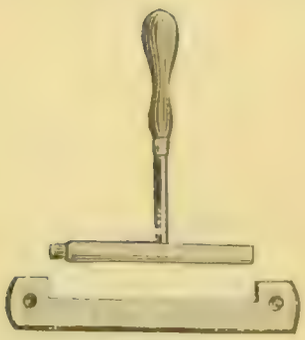


1903E

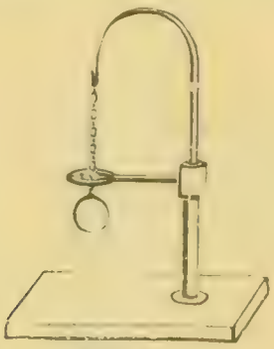


1904

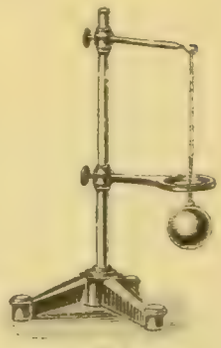
1903D **Dulong and Petit's Pyrometer,** for the determination of the coefficient of expansion of Metals with those of known Metals £7 10 0
1903E **Siemen's Water Pyrometer,** with Thermometer, and Six Copper Cylinders 5 5 0
1904 **Fire Syringe,** Brass, with Box at end for holding Amadou ... 0 5 6
1904A ,, ,, with strong Glass Cylinder 0 12 0
Amadou or German Tinder, for use with above ... per oz. 0 0 10
1905 **Fusible Metal** 0 1 0



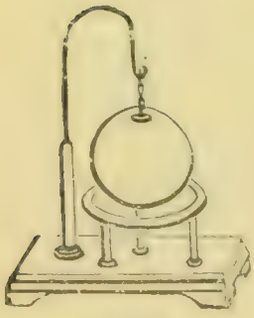
1906



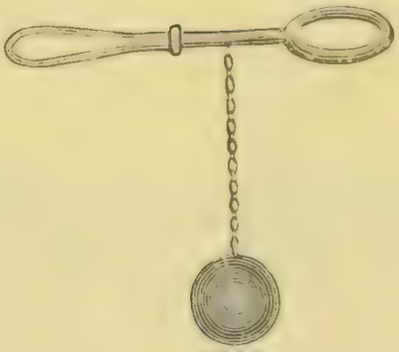
1907



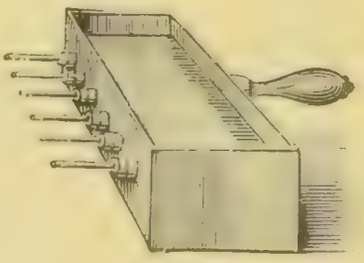
1907A



1908



1909

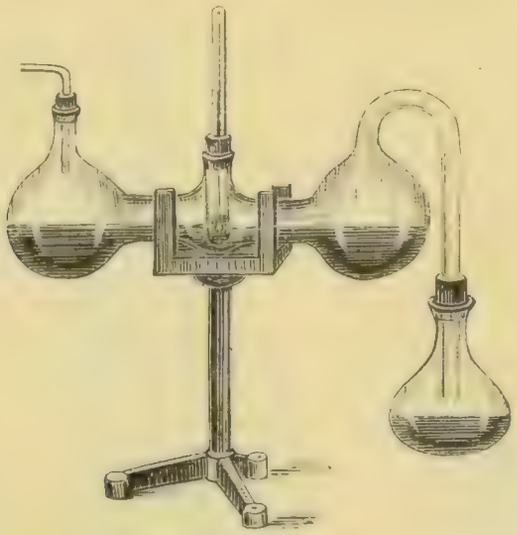


1912

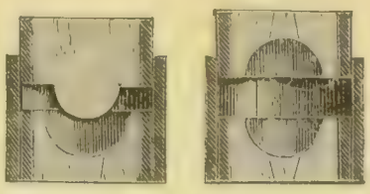
1906	**Gauge and Bar**	£0	5 0
	,, ,, Smaller size	0	4 0
1907	**Gravisande's Ball,** mounted on Stand each 6/6 and	0	12 6
1907A	,, ,, ,, on Iron Foot with Brass Ring ...	0	7 6
1908	,, ,, diameter of Ball 2½ in., best finish ...	0	17 6
1909	,, ,, Simple form	0	3 3
1911	**Ingenhouz's Trough,** 3 Holes, Japanned Tin	0	4 0
1912	,, ,, 6 ,, ,, ...	0	6 6



1913

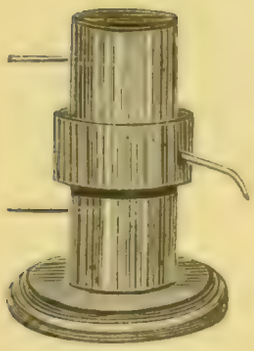


1913A

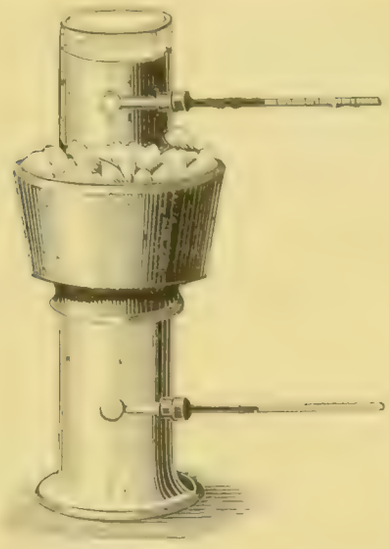


1913B

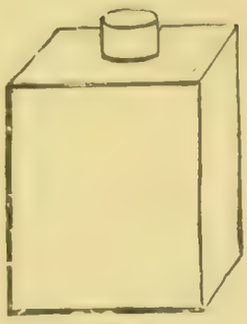
1913	**Iron Bottle,** with Screw Stopper ... each 1/3 and	£0	1 10
1913A	**Carre's Ice Freezing Apparatus,** mounted on Iron Stand, with Thermometer	1	0 0
1913B	**Wooden Moulds,** in 3 forms, bound with Iron Rings, for Ice experiments ... ... each	0	7 0
1913C	**Compression Apparatus,** "Oersted-Magnus," for condensation of gases, with Piezometer for compression of liquids, complete	8	5 0
1913D	**Jolly's Freezing Apparatus,** on Carre's principle, mounted on Polished Wood Stand	1	5 0
1913E	**Mousson's Apparatus** to show that under pressure Ice can be made liquid	1	10 0



1914



1915B



1916

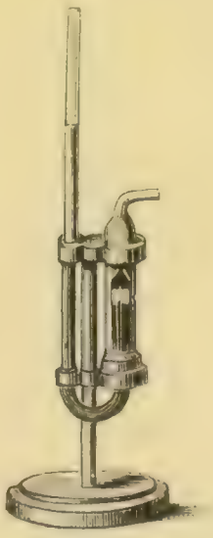


1917

1914 **Hope's Water Density Apparatus,** Brass Cylinder and Fittings £1 10 0
1915 ,, ,, ,, Japanned Tin ... 0 6 0
1915A ,, ,, ,, complete with two Thermometers, extra 0 3 0
1915B ,, ,, ,, Glass Cylinder, complete with Thermometers 0 16 0
1916 **Leslie's Cubical Tin Canisters** ... ... each 0 1 6
1917 **Tin Plate Cylinder,** for Crushing by Atmospheric Pressure when the air has been driven out by the steam of boiling water ... ... per doz. 5/6, each 0 0 6



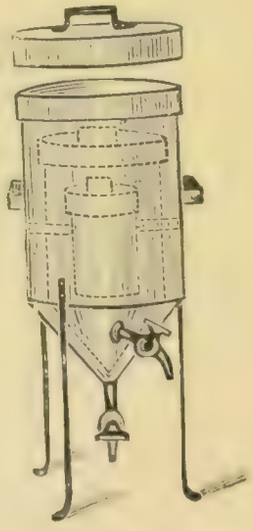
1918



1918A



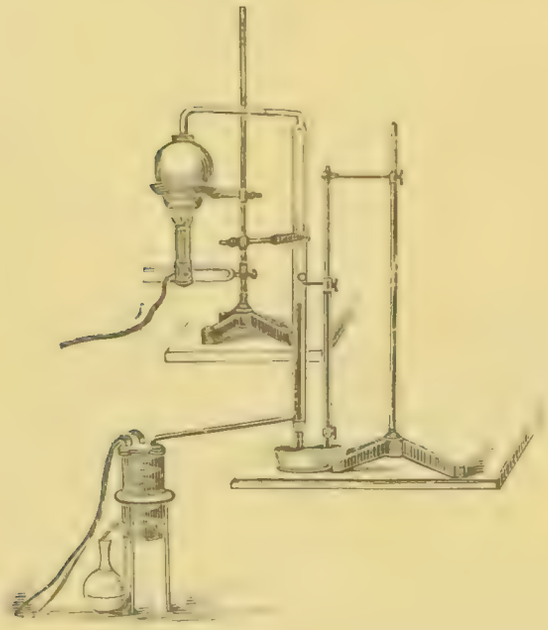
1918B



1919

1918 **Marcet's Steam Apparatus,** for showing experiments with steam under high pressure, &c.... ... ... £3 3 0
1918A **Mousson's Apparatus,** for measuring the elasticity of steam 0 17 6
1918B **Weinhold's Apparatus,** for measuring the tension of ether, so-called Steam Barometer 0 17 0
1919 **Lavoisier and Laplasse's Calorimeter,** Tin, with Stopcock and Covers for condensation 1 15 0
1919A **Carre's Apparatus,** for freezing by Sulphuric Acid ... 11 0 0

1919B	**Weinhold's Freezing Apparatus**	£0	9	6
1919C	,, **Double Calorimeter,** for determining the specific heat of two bodies	3	0	0
375A	**Thompson's Calorimeter,** in Mahogany Case, complete (see page 52)	5	10	0
748	**Bunsen's Calorimeter** (see page 111) each 2 . 2 6. and	0	3	0



1919D



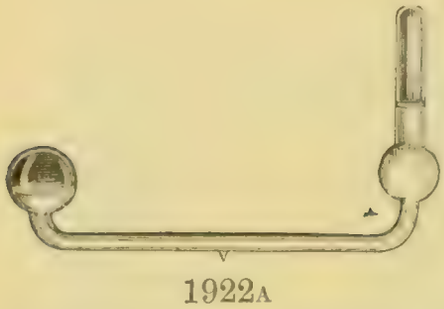
1921



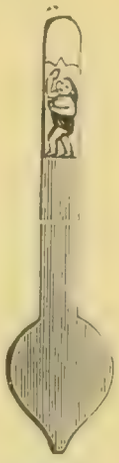
1922



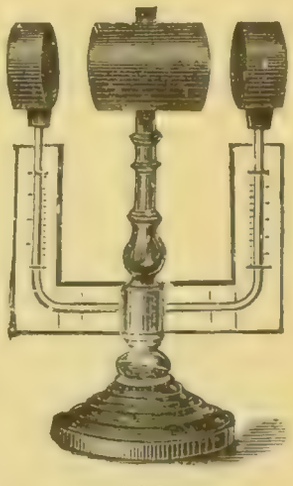
1920



1922A



1923



1924

1919D	**Vapour Density Apparatus,** Hofmann's, with Graduated Barometer Tube, Gas Burner, Copper Flask, and Condenser, on Iron Stand	£7	0	0
1920	**Pulse Glass**	0	1	3
1923	,, with Cartesian Figure enclosed ...	0	1	0
1921	**Water Hammer** ... ... 1/ and	0	1	6
1922	,, Forked ... . 1/6 and	0	2	0
1922A	,, New form	0	2	0
1924	**Ritchie's Apparatus,** for showing absorption and radiation of heat	1	15	0



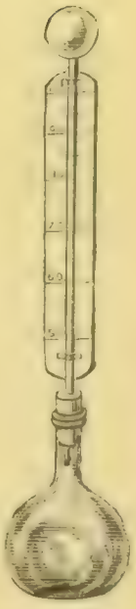
1925



1925A

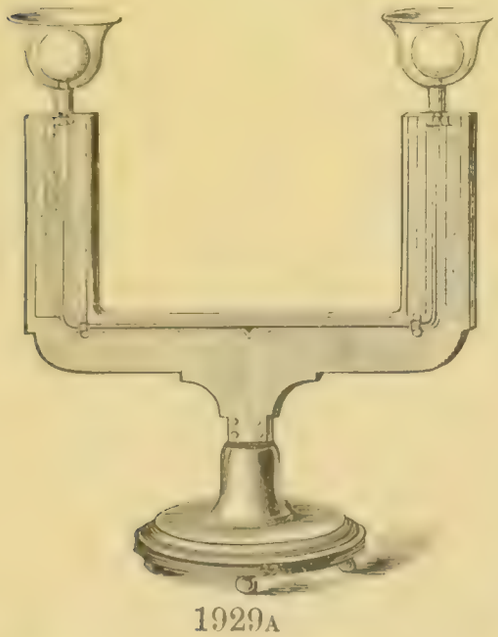


1928



1929

1925	**Wollaston's Cryophorus**	£0	2	6
1925A	,, **Sulphuric Acid Cryophorus,** for freezing water without the freezing mixture ...	0	4	3
1926	**Tyndall's Apparatus,** to show expansion	1	4	0
1927	,, **Heat Absorption Apparatus**	1	12	6
1928	**Model Thermometer,** with Flask, Tube, and Scale attached	0	3	6
1929	**Air Thermometer,** consisting of Flask, Tube with Bulb, and Scale attached	0	3	6



1929A

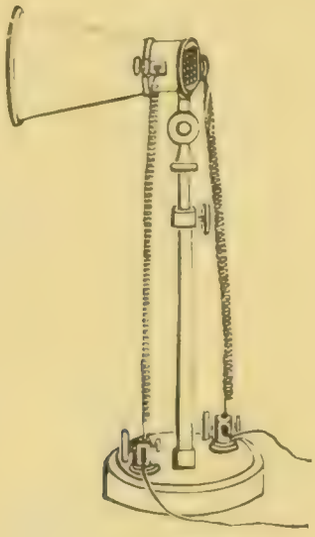


1929B

1929A	**Shumann's Differential Thermometer.** The Bulbs of Thermometers are surrounded by two Glass Cups for containing the liquid used in the experiment ...	£0	17	6
1929B	**Metal Thermometer,** Swiss form, with maximum and minimum degrees	2	10	0
1929C	,, with Electrical Contact ... ... extra	0	7	0

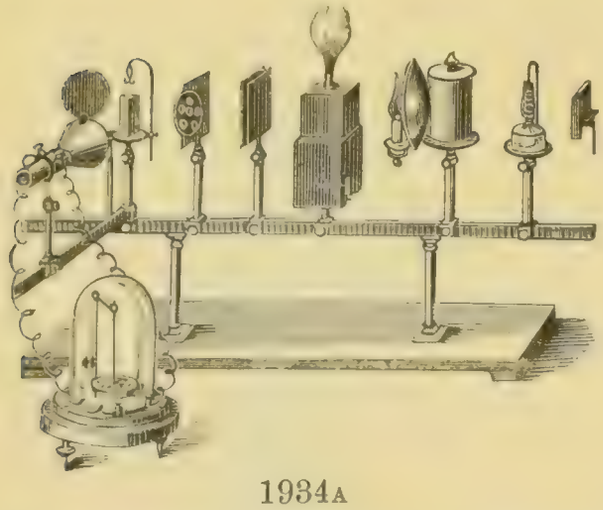


1930

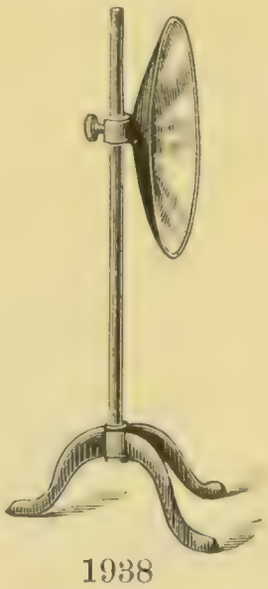


1932

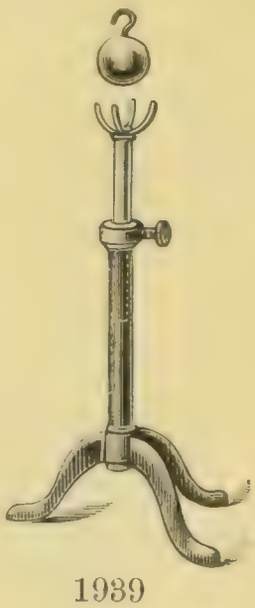
1930 **Thermopile,** mounted on Brass Stand, 12 pairs... ... £0 17 3
1931 „ „ „ 20 „ 1 5 0
1932 „ „ „ best, with Joint, Sliding Tube and Terminals on base, without Cone, 40 pairs 2 5 0
1933 „ „ „ „ „ 60 „ 2 15 0
63 „ 3 3 0
1934 **Cones,** Copper, Silver Plated inside, for above ... extra 0 5 0



1934A



1938



1939

1934A **Thermo Electric Apparatus,** Melloni's, on Polished Mahogany Stand, consisting of Horizontal Measuring Rod 1 metre long supported on 2 Brass Pillars, upon which are 6 Sliding Brass Stands, with arrangement for raising and lowering, attached to which are the following accessories:—Spirit Lamp on Table, with Platinum Spiral; Holder and Copper Stirrup; Locatelli's Lamp; Spirit Lamp with Brass Top; Leslie's Cube; Double Blackened Screen with Moveable Shutter; Stand with Moveable Band; Circle Divisions and Pointer, with Holder for fixing the Plates; Thermopile, 25 pairs, with Conical and Cylindrical Cones, and Testing Galvanometer ... £15 0 0
1934B „ with a more sensitive Galvanometer 18 0 0

1938 **Reflectors,** pair Concave, Planished Tin, diameter 15 in., mounted on Iron Tripod Stand £1 1 0

1938A „ Copper, Silvered, with Tin Backs, mounted on Iron Tripod Stand—

6	9	12 in.
18/6	25/	30/ per pair

1938B „ Polished Brass, with Sponge and Ball Holder, mounted on Iron Stand, 12 in. diam., per pair 4 0 0

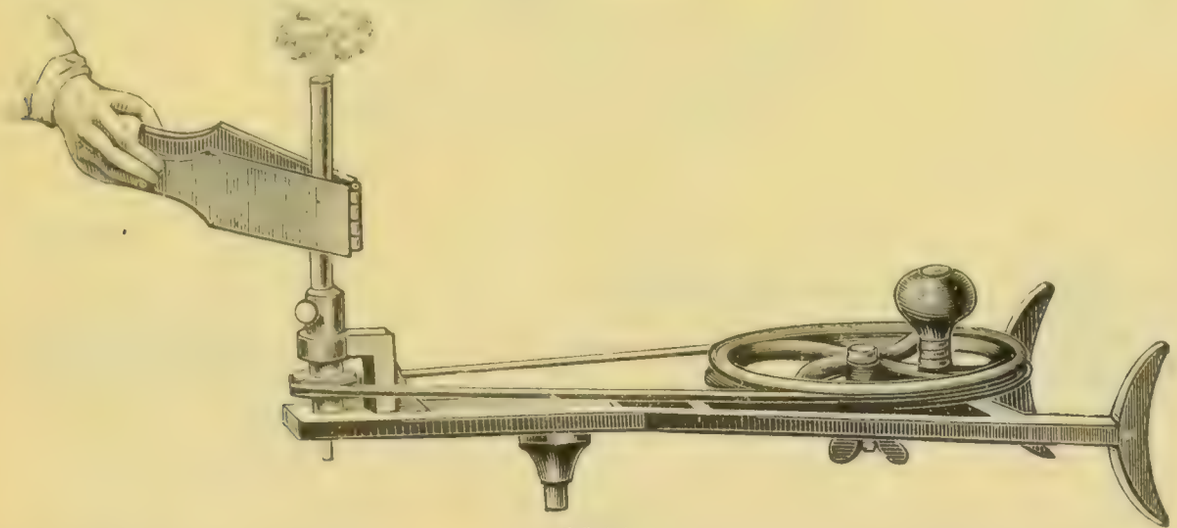
1939 „ Iron Ball & Stand, for use with Thermo-Multiplier 0 5 6

1940 **Rumford's Thermoscope** 0 12 6

1941 **Thermometer Tubes** ... ... per lb. 0 2 0

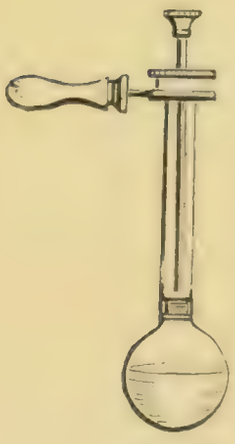
1942 „ „ with Bulb ... ... each 0 0 3

1943 „ „ filled with Mercury 0 0 6



1944

1944 **Wheel Multiplying,** Iron, arranged for Horizontal or Vertical movements, with Oak Board for friction £1 12 0



1946

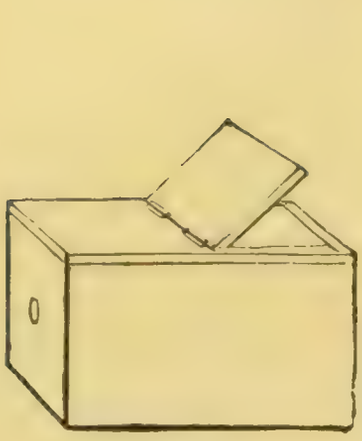


1946A

1946 **Wollaston's Steam Piston,** stout Glass Bulb £0 6 0

1946A **Atometer,** with graduated Tube filled with Spirit, as described in Reynold's Chemistry 0 6 0

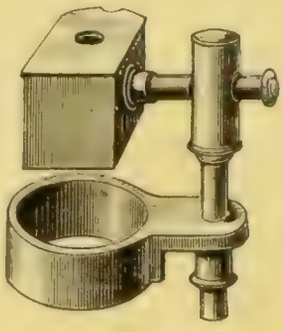
LIGHT EXPERIMENTS.



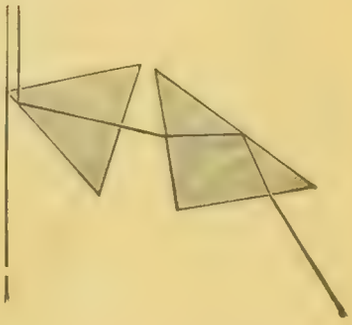
1947

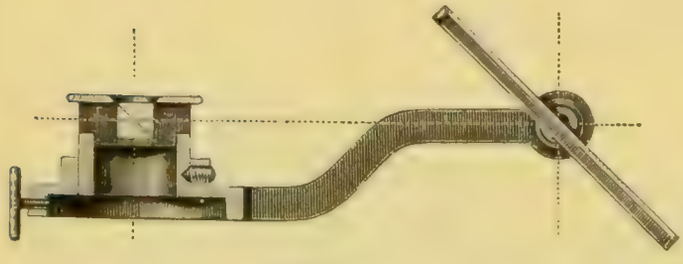


1948



1948A





1948B



1949 1950

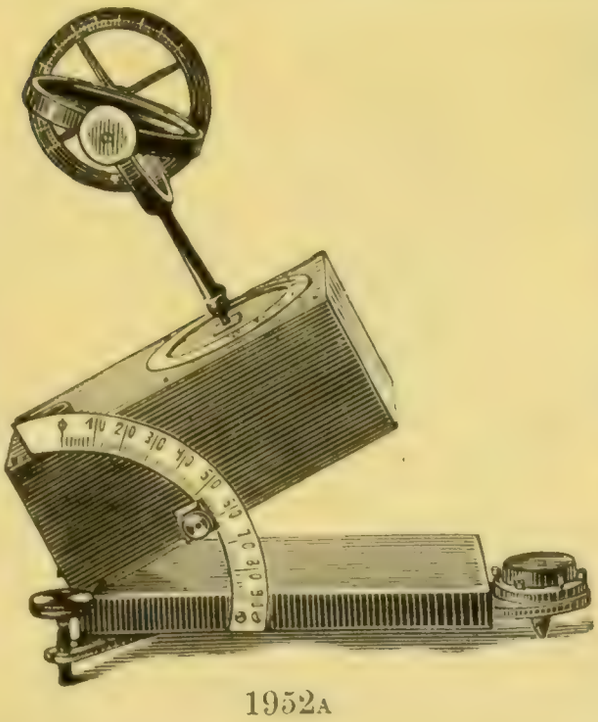


1951

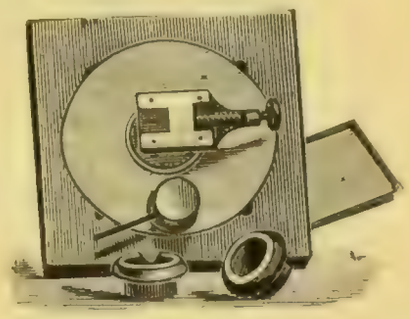
1947	**Camera Obscura,** Mahogany	£0	12 6
	,, ,, Blackwood	0	9 6
1947A	**Apparatus,** for showing image of candle, as described in Roscoe's Science Primer	0	10 6
1947B	**Camera,** Pinhole	0	3 6
1948	**Camera Lucida,** Wollaston's, mounted on Brass Stand ...	2	0 0
	,, ,, ,, Simple form	0	16 0
1948A	,, ,, "Zeiss," with 2 Prisms, for fixing over Eye Piece	1	5 0
1948B	,, ,, "Abbe"	2	0 0
1949	**Cells,** Glass, Flat, for lantern work ... ... per pair	0	5 6
1950	,, ,, Wedge shape .. ... ,,	0	8 6
1951	,, ,, Trough, 5 divisions ... ... each	0	7 0



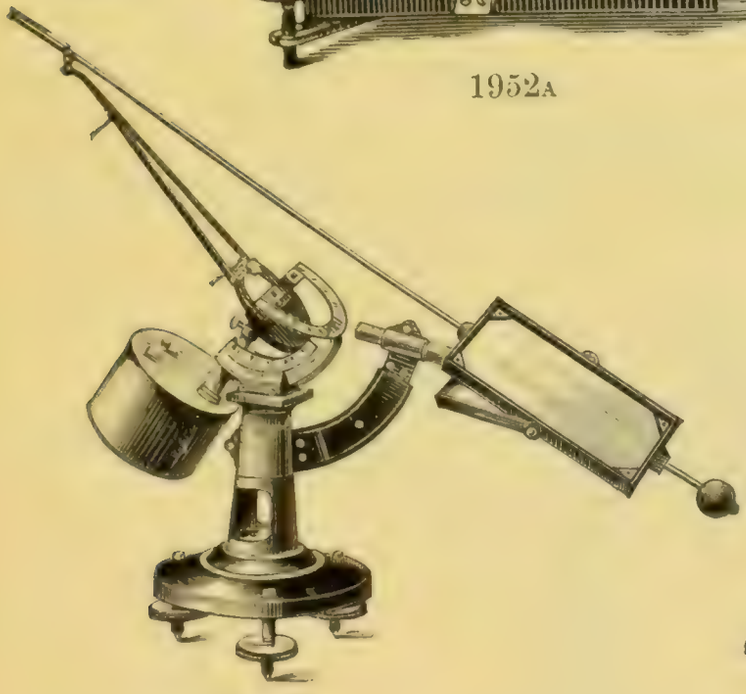
1952



1952A



1952B



1952C



1953

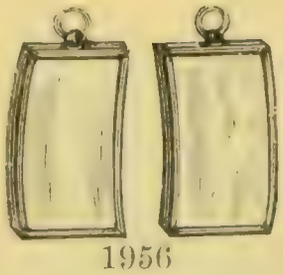


1954

1952	**Heliostat,**	Polished Brass, with Clockwork to revolve Mirror		£3 15	0
1952A	,,	with Clockwork in Mahogany Case, best finish, Spirit Level, Levelling Screws and Divided Circle ...		7 10	0
1952B	,,	with flat Mirror, adjusting slit, Micrometer Screw and Colour Glasses, on Polished Blackwood Base, to fix to window		2 0	0
1952C	,,	best quality Movements, with Divided Circle ...		21 0	0
1953	**Mirrors,**	Concave, Glass, Silvered, on Stands,	6 in. per pair	0 10	6
			9 in. ,,	0 14	6
1954	,,	Convex	6 in. ,,	0 12	6
			9 in. ,,	0 16	6
1954A	,,	Concave and Convex, Silvered, Copper, on Stands	9 in. ,,	0 17	6



1955



1956



1958

1955 **Mirrors,** Concave, Copper, Silvered, best make, about 12 in. diam., with Ball and Sponge Holder, on Stand per pair £3 0 0

1956 ,, Concave and Convex, 9 in. × 6 in., in Blackwood Frame .. .. per pair 1 1 6

1957 Set of Two Lenses, Concave and Convex, 4 in. diam., equal focal length, mounted on Wooden Stand 1 1 0

1958 **Ground Glass Plate or Screen,** 8 in. diam., on Mahogany Stand 0 5 0



1959

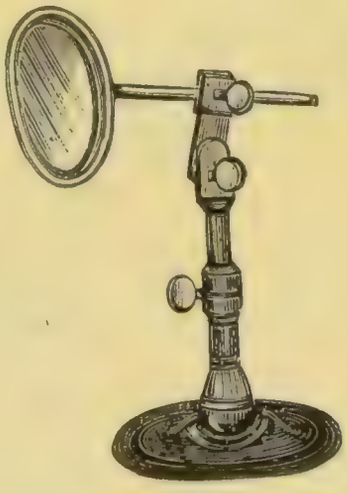


1960

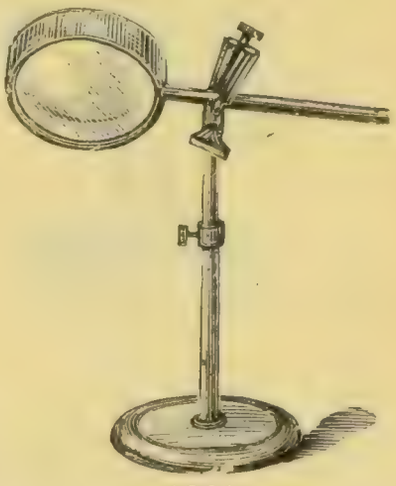


1960A

1960B



1961A



1961B

1959 **Lenses,** Set of 6 different Lenses, $2\frac{1}{2}$ in. diam., with 6 Half Lenses £0 18 6

1960 ,, Set of 4 different Lenses, $2\frac{1}{2}$ in. diam., mounted in Wooden Rings, with Brass Rods 0 16 0

Frames only, for above ... ... each 0 1 9

1960A ,, Plano-Convex, for Condensers—

3	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	4	$4\frac{1}{2}$	$5\frac{1}{16}$	$6\frac{3}{8}$ in. diam.
$5\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{2}$	6	7	$7\frac{1}{2}$	10 in. focal length
2/6	2/9	3/3	3/9	4/3	6/6	7/6	13/6 each

1960B **Lenses,** Hemispherical, for Dissolving View Lanterns—

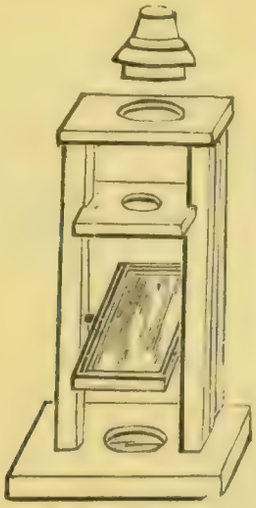
$2\frac{1}{16}$	$2\frac{1}{16}$	$3\frac{1}{2}$	$4\frac{1}{4}$	$5\frac{5}{16}$ in. diam.
1/9	2/6	5/6	7/6	14/6 each

1961A **Universal Holder,** to support Lenses, &c., Polished Mahogany £0 5 6

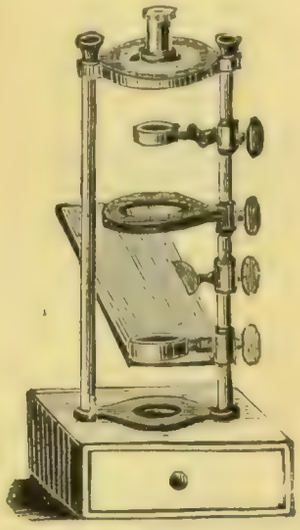
1961B ,, ,, Iron Foot, Brass Rod and Fittings ... 0 5 6



1962



1963



1963A

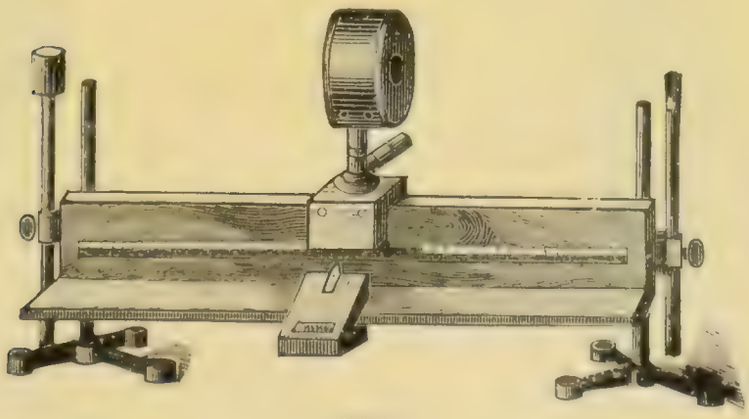
1962 **Newton's Ring Apparatus,** Brass, with Adjusting Screws... £0 10 6

1963 **Norremberg's Polariscope** 1 5 0

1963A **Polariscope,** best make, with Nicol's Prism, Double Refracting Prism, six Crystals and Disc, annealed Glasses, complete in Mahogany Box 6 10 0

1963B **Polarised Light Apparatus,** for Students' use, which comprises the following: Polariser, Brass mounted; Analyser, direct and reflecting; and specimens of Calc Spar, "Uniaxial;" Nitre, "Biaxial;" Quartz, "Circular;" Plate of Horn, "Organic;" Benzoic Acid, Selenite (Even, Uneven, Wedge, and one Design), with Instructions, in Case, complete ... 1 10 0

(*See also Polariscopes, page* 177.)

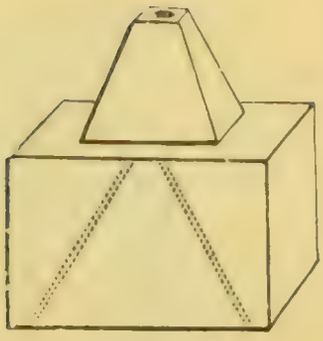


1965

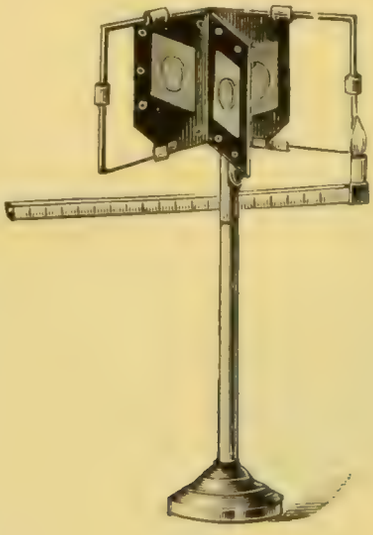
1965 **Photometer,** Bunsen's £2 15 0

1965A ,, Elster's, with Scale, Diaphragm and 2 Mirrors, on Brass Stand 1 5 0

1966 ,, Wheatstone's 1 15 0



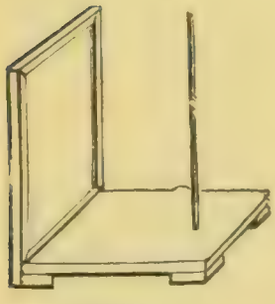
1967



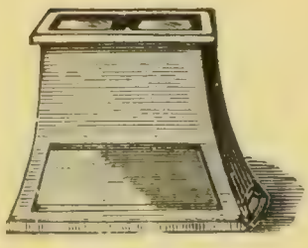
1967A

1967 **Photometer,** Ritchie's £0 15 6

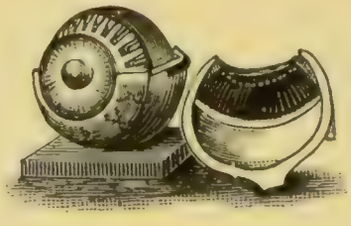
1967A „ Bunsen's, another form, mounted on Stand, Graduated Scale and Candle Holder ... 1 17 6



1968



1969



1970A



1970B

1968 **Photometer,** Rumford's, Portable £0 7 6

1969 **Stereoscope,** in Mahogany Case, cheap form 0 4 6

1969A „ with Rack Adjustment, in Rosewood Case ... 0 15 6

1969B „ with Pinion at side, curved body, in Walnut or Rosewood 1 1 0

Slides for above, assorted per doz. 2/ and 0 3 0

„ „ „ Coloured „ 3/6 „ 0 4 6

1969E **Pantoscope,** with Elliptical Lens, in Walnut or Rosewood ... 1 5 0

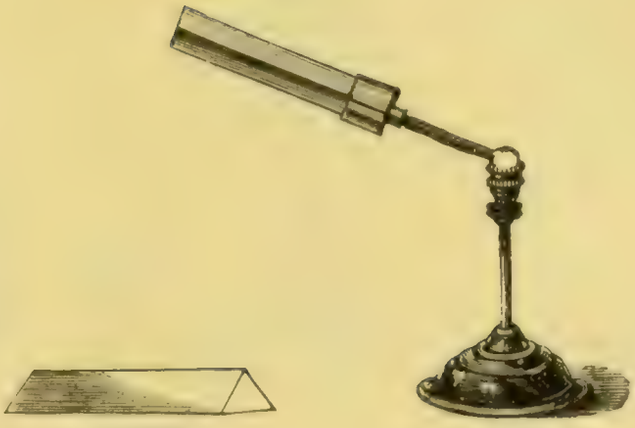
1969F „ with Eye Pieces, Rack Adjustment, and Camera Obscura... ... ... 2 12 6

1970A **Model of Eye,** by Bock, 14/6 ... ... large 0 18 6

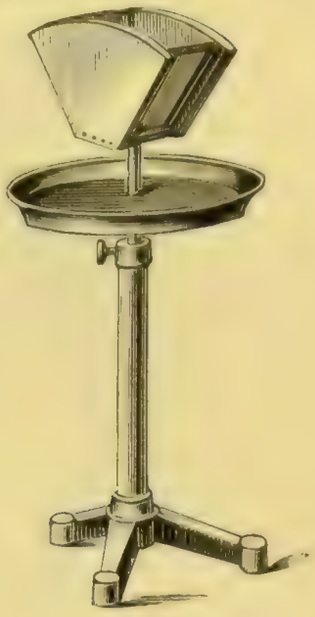
1970B **Optical Eye,** to explain Myopy and Presbyopy 0 16 0



1971



1973 1974



1974B

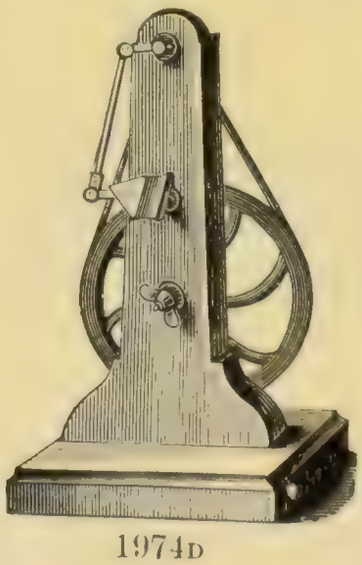
1971	**Kaleidoscopes,** simple, in Zinc Case	£0	1 3
1971A	„ Brass Case	0	3 0
1971B	„ Brass Case, Nickel Plated, on Stand, 6/ and	0	10 0
1972	**Plates of Coloured Glass,** Cobalt, Green, Yellow and Red—		
	4 in. × 4 in., per dozen	0	3 0
	6 in. × 6 in. „	0	5 0
1973	**Prism of Glass,** with plane ends, 1 in. face—		

Length	3	3½	4	5 in.
	1/	1/3	1/6	2/6 each

1974	**Glass Prism,** 5 in. long, mounted on Brass Stand, with Ball and Socket Joint	0	12 0
1974A	**Prism,** Hollow, with Adjustable Angle for Fluids, Adjusting Screws, Plate and Graduated Arc, on Polished Mahogany Stand	2	0 0
1974B	„ „ without Adjusting Screw or Graduated Arc...	1	10 0

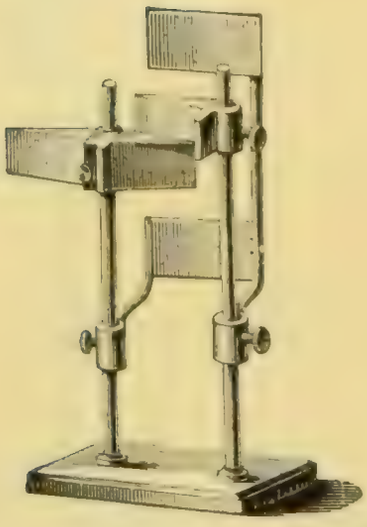


1974C

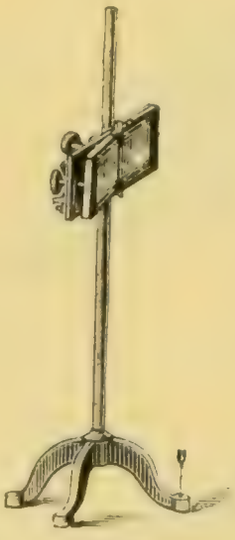


1974D

1974C	**Prism,** Hollow, Silberman's, with Divisions to show that the deviation increases with the increase in the refraction, complete with 2 Prisms, for Alcohol and Water	£3	15 0
1974D	„ Oscillating, for mixing the Colours of the Spectrum...	2	12 6



1974E

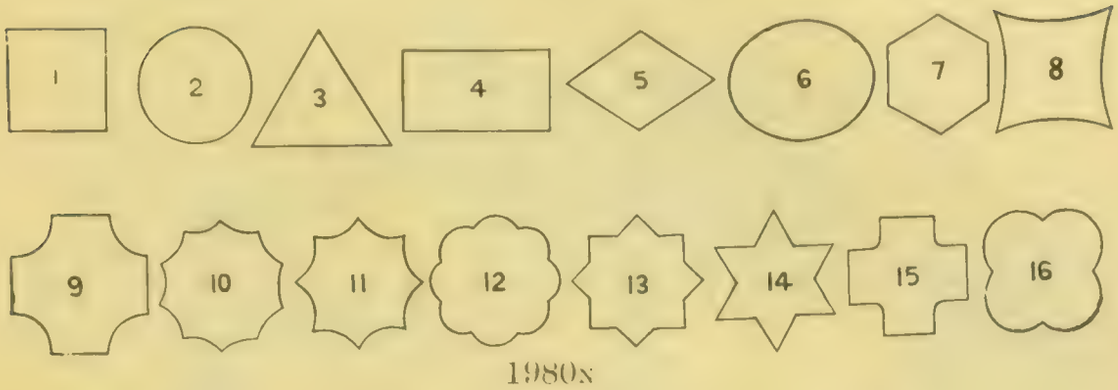


1974F

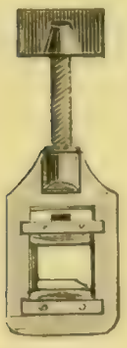


1975

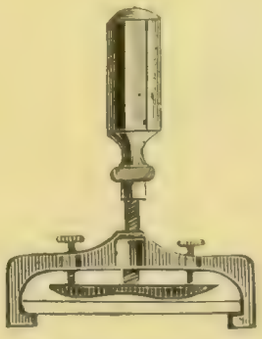
1974E	**Apparatus,** with 3 Prisms, to show the achromatic and direct vision Prisms	£2	18 0
1974F	**Fresnel's Interference Prism,** mounted on Metal Stand, with Micrometer Screw	3	10 0
1975	**Prismatic Bottle,** for Carbon Bisulphide ... 9/6 and	0	15 0
1975A	**Ahren's Bisulphide Prism,** angle 60°, mounted in Wood Frame	0	12 6
1976	**Triangular Prism,** with plane ends, having angles 75°, 60°, and 45°, 1½ in. long	0	7 6
1977	**Right Angled Prism,** 1 in. face	0	7 6
1978	**Complementary Prisms** of Flint and Crown Glass ...	0	9 6
1979A	**Nicol's Prism,** for Microscope ...per pair 12/6, 15/6, and	0	18 6
1980	**Prism,** with Obtuse Angle to show interference of light ...	0	4 6
1980A	,, Camera Lucida ... ... each	0	4 6
1980B	,, Binocular, Wenham's ... ... ,,	0	9 6
1980C	,, Parabolar ,, ... 12/6 and	0	15 6
1980D	,, Double Image of Glass and Spar ... 9/6 and	0	13 6
1980E	,, Quartz, 1 in. square	1	12 6
1980F	,, Polyprism of 6 kinds of glass, 3 × 1¼ in.... ...	2	12 6
1980G	,, Fresnel's Bi-Prism, best quality	0	10 6
1980H	,, Achromatic, for Illustration ... per pair 10/6 and	0	13 6
1980I	**Wedges,** "Stoke's," to show Bands	0	9 0
1980K	,, Selenite, 1¼ in. square	1	5 0
1980L	**Prisms,** Set of 3, to demonstrate Achromatism and the direct vision Spectroscope	2	10 0
	,, With Brass Stands	3	10 0
1980M	**Cone,** Glass, for the production of Circular Spectrum ...	0	3 0
	,, Best quality Crown Glass	1	3 0
	,, ,, Flint ,, ...	1	7 0



1980N



1980Q



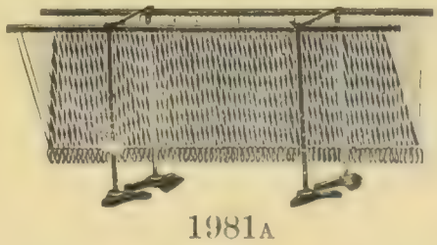
1980R

1980N **Unannealed Glass,** in 16 different forms—

	Nos. 1 to 5	...	...	...	4/ to	£0	5 6
	„ 6 to 8	...	...	...	4/ to	0	6 6
	„ 10 to 16	...	...	...	6/6 to	0	12 6
	„ 9 and 16	...	...	...	5/ and	0	8 0
1980O	**Unannealed Cubes,** of Uranium Glass, according to size				11/ to	0	17 0
1980P	**Uranium Glass Specimens,** about $3 \times 2 \times \frac{1}{4}$ in....				each	0	3 6
1980Q	**Presses,** for showing the Polarisation of Glass under pressure					0	15 0
1980R	„ for bending					0	15 0
1980S	Collection of 7 Plates of Quartz, perpendicular to the axis, of different thicknesses, showing the Colours of the Spectrum					2	2 0



1981

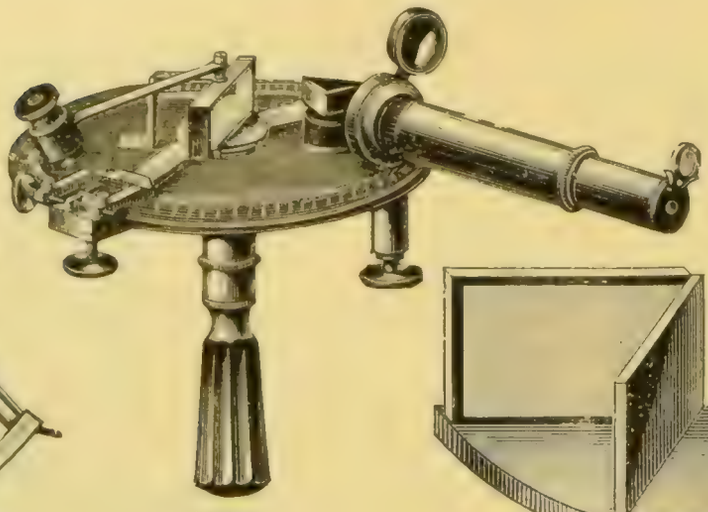


1981A

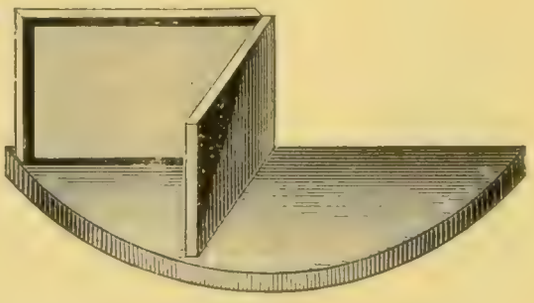
1981	**Powell's Wave Apparatus**	£3	3	0
1981A	**Weinhold's Longitudinal Apparatus,** for the Reflection of Waves, supported on 4 Iron Stands	4	0	0
1981B	**Weinhold's Projection Wave Apparatus,** with 4 Round and 2 Right Angled Glass Plates	2	10	0
1981C	**Wave Apparatus,** Fessel and Plücker, with Longitudinal and Elliptical Motion	6	15	0
1983	**Sextant,** Model, Science and Art Pattern	0	6	0
1983B	**Reflecting Circle,** Model, Science and Art Pattern ...	0	6	0



1983c



1983e



1983f

1983c **Mirror Sextant,** Brass, with 2 dark Glasses, Graduated Arc and Vernier, reading to 5 minutes, without Telescope £2 2 0

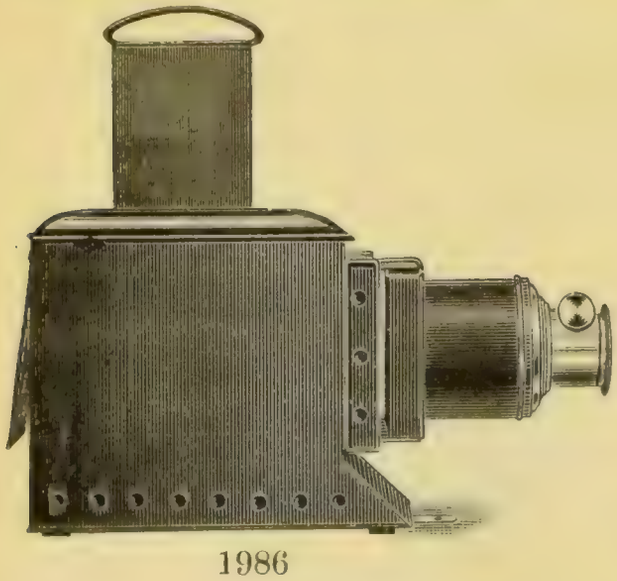
1983d ,, with 4 dark Glasses and Telescope ... 2 12 6

1983e **Reflecting Circle,** Pistor & Martin's, diameter of Circle 26 c.m., with Mirror, Prism, Telescope, and Sun Glasses between Prism and Telescope, revolving 180° ... 18 10 0

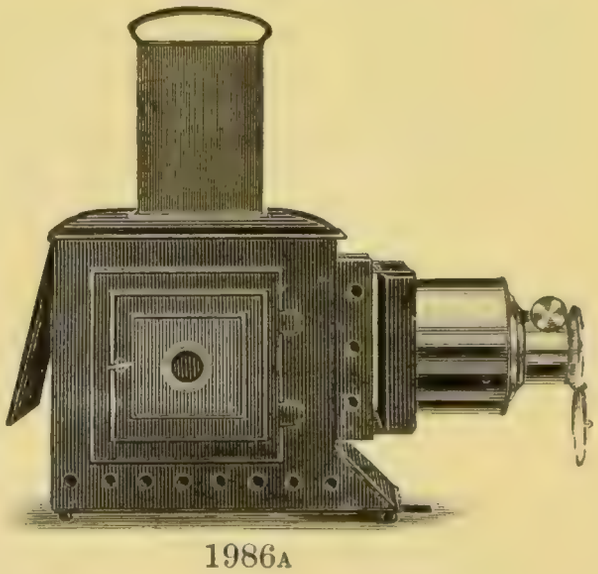
1983f **Angle Mirror,** with divided Circle and Hinge 0 15 6

1984 **Plates of Quartz,** Aragonite, Calcite, Selenite, and Nitre, per set from £1/1/ to 2 2 0

1985 **Rhombs,** of Iceland Spar ... ... each 21/ to 1 10 0



1986



1986a

1986 **Lantern,** Japanned Tin, with dome shaped top, fitted with 4 in. plano-convex Compound Condenser, Double Achromatic Front Lenses, Rack and Pinion Adjustment, with a 3-wick Russian Iron Paraffin Lamp, packed in black stained Box, with Leather Handle £2 5 0

With Improved 4-wick Paraffin Lamp ... 2 8 0

1986a ,, with Mahogany Body, Panel Door, and Sight Hole, 4 in. plano-convex Compound Condenser, Double Combination Achromatic Front Lenses, Rack and Pinion Adjustment, fitted with Sliding Shutter and 4 in. improved Russian Iron Lamp. In French Polished Wood Case with Lock and Key, and Leather Handle 4 4 0

1986F **Lantern,** New Shape Polished Mahogany Body with Panelled Door, and Brass-bound Sight Hole, lined with Japanned Tin, with Dome-shaped Top, and with the entire Stage and Front Tube and Sliding Tube made in Brass, beautifully finished and lacquered. Fitted with a 4 in. plano-convex Compound Condenser in Brass Cell and Double Combination Achromatic Front Lenses, 2 in. diameter, 5¼ in. equivalent focus, with Double Pinions to the rack adjustment, and fitted with a Sliding Flasher or Shutter, with a 4-wick improved shape (Regd.) Russian Iron Paraffin Lamp with Jointed Russian Iron Chimney. Fitted in a Stained and French Polished Case, with Lock and Key, and Leather Handle £4 17 6

1986G Pair of the above Lanterns fitted in a Stained and French Polished Double Case, with Lock and Key, and Leather Handle, and an improved Brass Dissolver, with Plates and Thumb Screws, &c., complete ... ... per pair 10 10 0

Japanned Tin Sliding Tray and Short Russian Iron Chimney, for use when the Limelight is applied 0 3 0

(*Other Lanterns can be supplied from* £5 *to* £20 *to order.*)

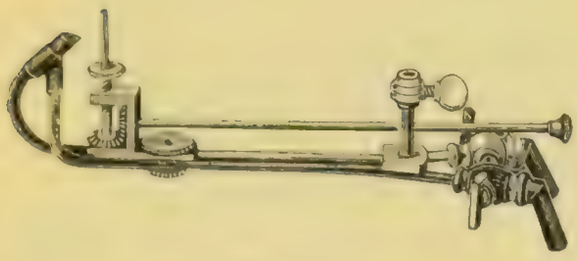


Fig. 1.

1986c

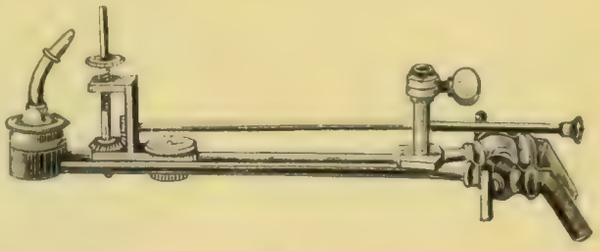


Fig. 2.

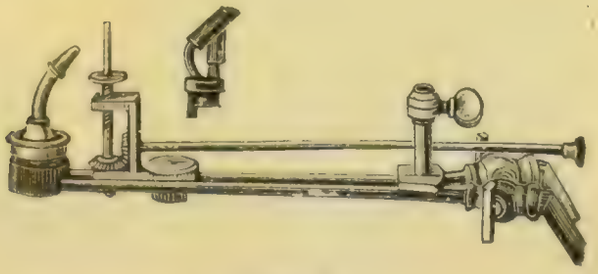


Fig. 3.

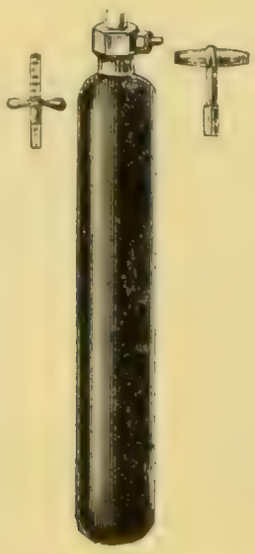
1986c Fig. 1. Oxy-hydrogen Safety Blow-through Jet, with Cog Wheel adjustment for turning, raising, or lowering the Lime Cylinder, and Platinum Nipple to Oxygen tube ... £0 16 0

Fig. 2. Superior quality, same as above, Mixed Gas Jet ... 1 2 6

Fig. 3. ,, ,, with Interchangeable Jet, which can be used as a Safety Blow-through or Mixed Gas Jet, with Platinum Nipples to both Burners 1 7 0

Best Hard Lime Cylinders, in Hermetically Sealed Tins, per doz. 0 2 3

1986D **Compressed Oxygen** ... ... per cubic foot 0 0 4



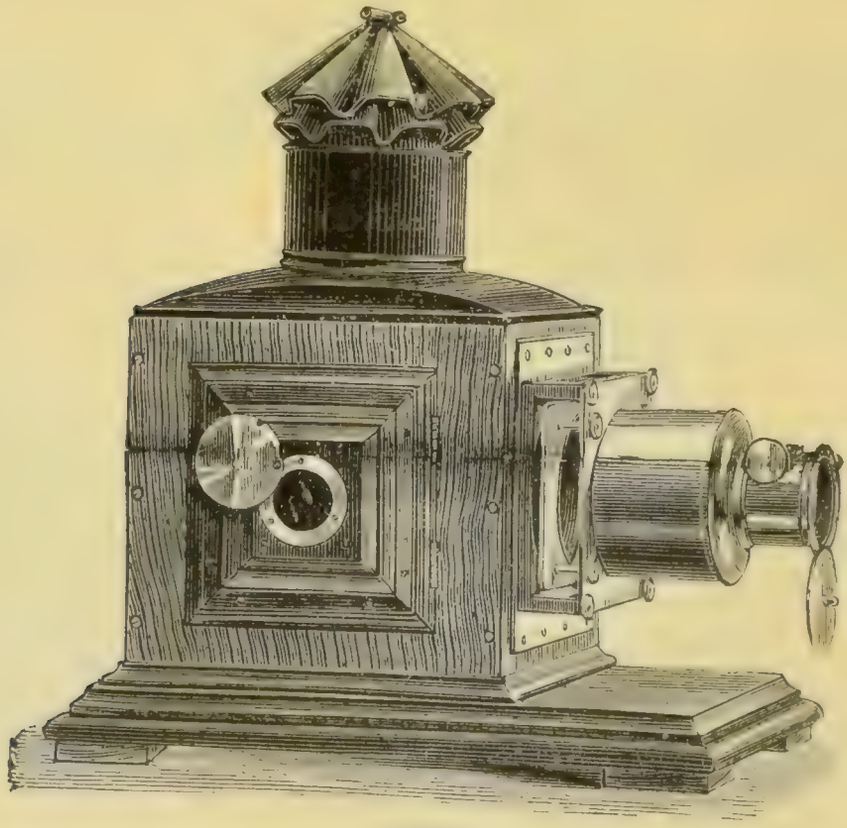
1986E

1986E **Cylinders for Compressed Oxygen**—

To hold 10	15	20	40 cubic feet
45/	50/	55/	70/ each

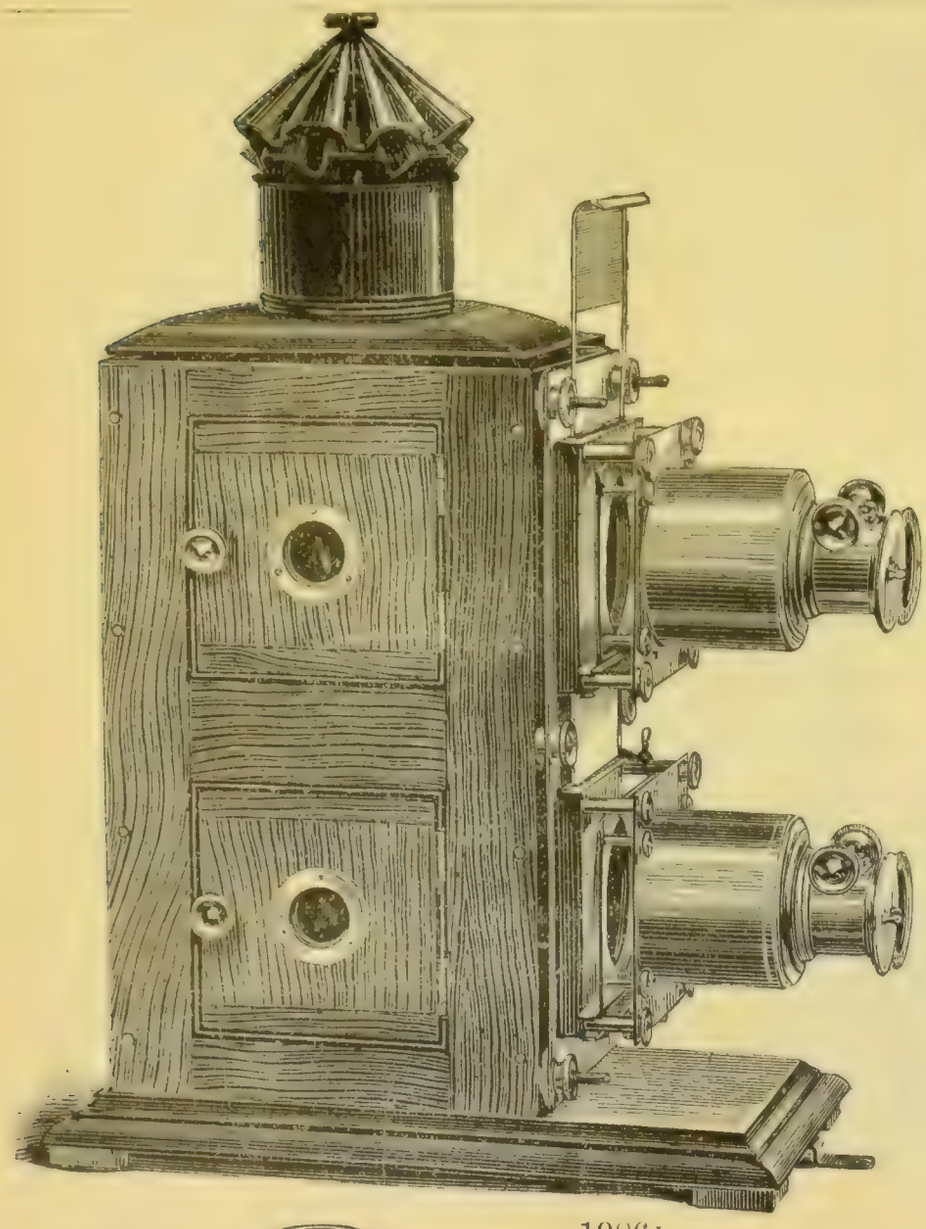
Fittings for above, Tap, Union, and Key £0 6 6

(*Rent must be charged on Cylinders if kept more than* 14 *days.*)



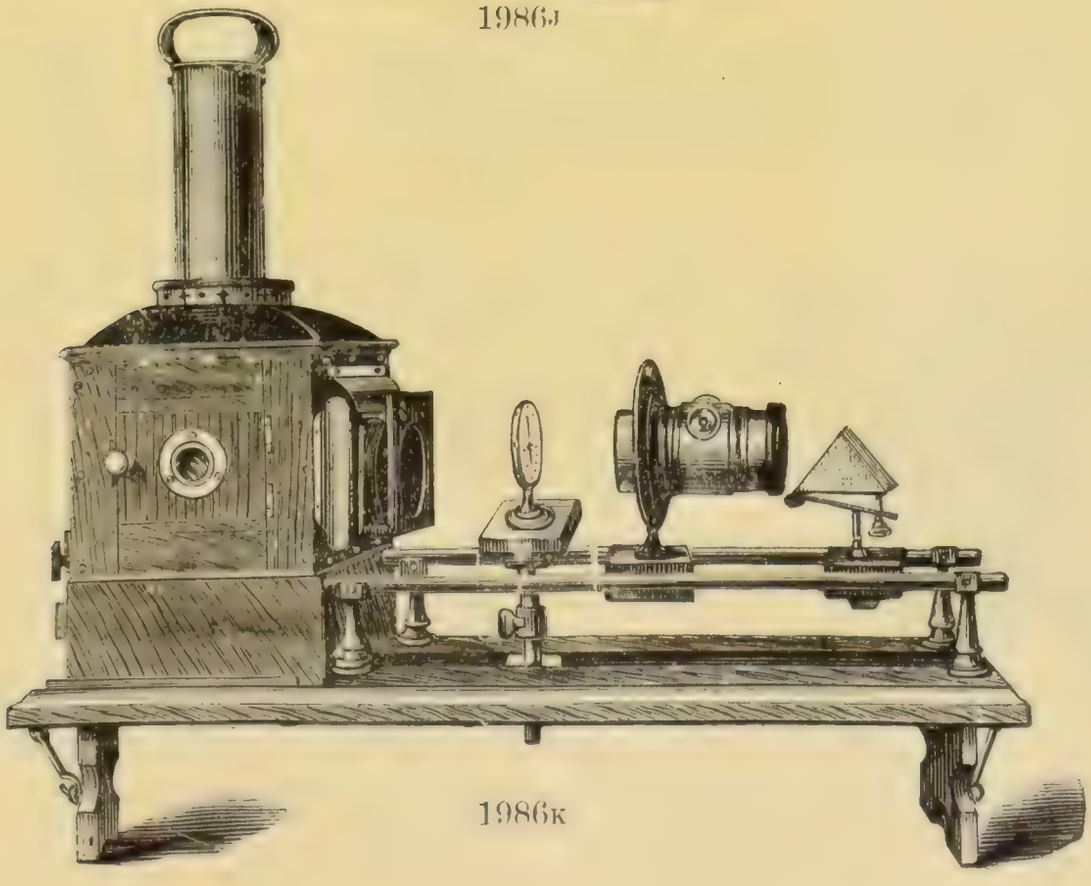
1986H

1986H **Lantern,** Polished Mahogany Body, with Moulded Foot and two Panelled Doors, with Brass-bound Sight Holes with Sliding Shutters, lined with Japanned Tin, with Japanned Tin Dome and Rose Top, and the Stage and Front Tube and Sliding O.G. Tube, made entirely of Brass, beautifully finished and lacquered. Fitted with 4 in. plano-convex Compound Condenser in Brass Cell, and Double Combination Achromatic Front Lenses 2 in. diameter, 5¼ in. equivalent focus, in Brass Mount, with Double Pinions to the Rack Adjustment, and fitted with a Sliding Shutter or Flasher ... £6 6 0



1986J

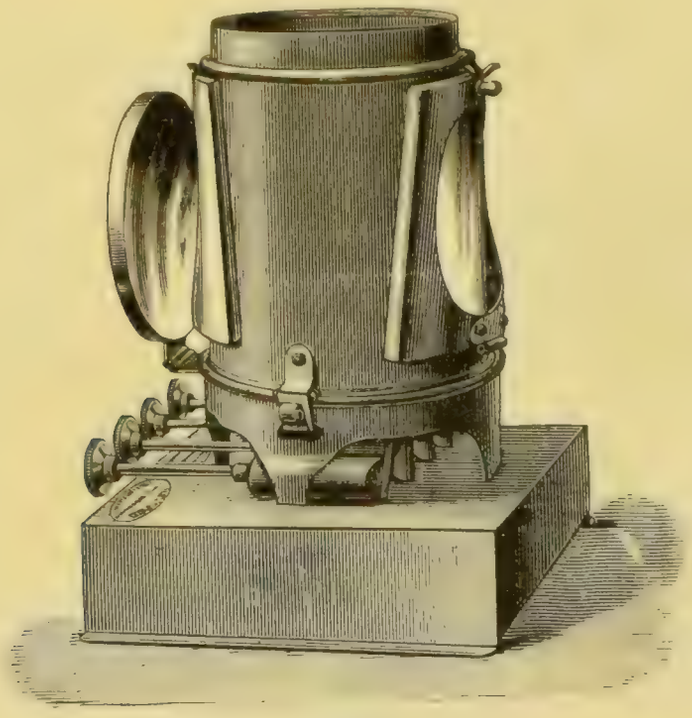
1986J **Bi-Unial Lantern,** Polished Mahogany Body with Moulded Foot and four Doors, with Brass-bound Sight Holes, lined with Japanned Tin, Japanned Tin Dome and Rose Top, and Stages and Front Tubes made entirely of Brass, beautifully finished and lacquered, and with Brass rolling curtain effect. Fitted with 4 in. diam. plano-convex Compound Condensers, mounted in Brass Cells, and Double Combination Achromatic Front Lenses 2 in. diameter, $5\frac{1}{4}$ in. equivalent focus, in Brass mounts, and with Double Pinions to the Rack Adjustments, and fitted with Sliding Shutters or Flashers £8 15 0



1986K

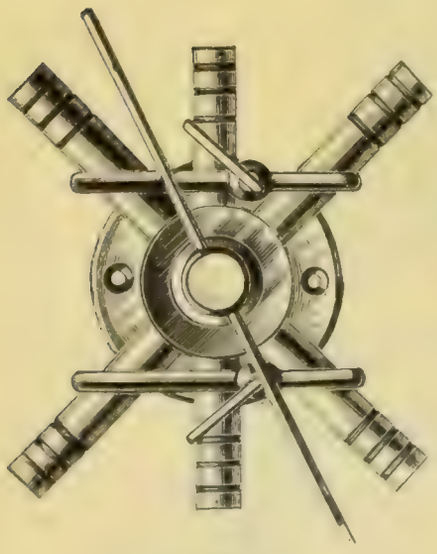
1986K **Special Educational Lantern,** a most effective and reliable Apparatus for projecting Chemical and Physical Experiments on the Screen, solidly constructed, Polished Mahogany Body lined with Iron, Brass Limelight Tray, Spring Side Holders, 4 in. best Compound Condensers, Double Combination Front Lens about 2½ in. diameter, large Rack and Pinion Mount, Polished Mahogany Stand with moveable feet, complete £16 0 0

1986L Same as above, with smaller Front Lens 12 0 0

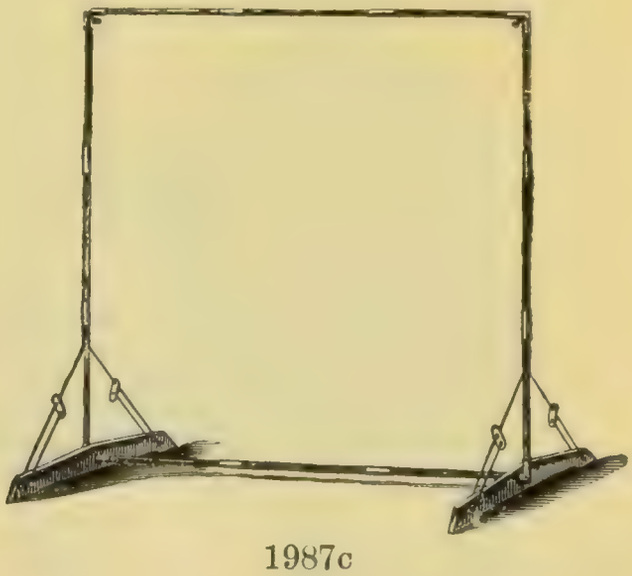


1987A

1987A **Pamphengos Lamp,** Hughes' latest pattern, very powerful, intensely white light, perfect combustion, no smell or smoke £2 2 0



1987B

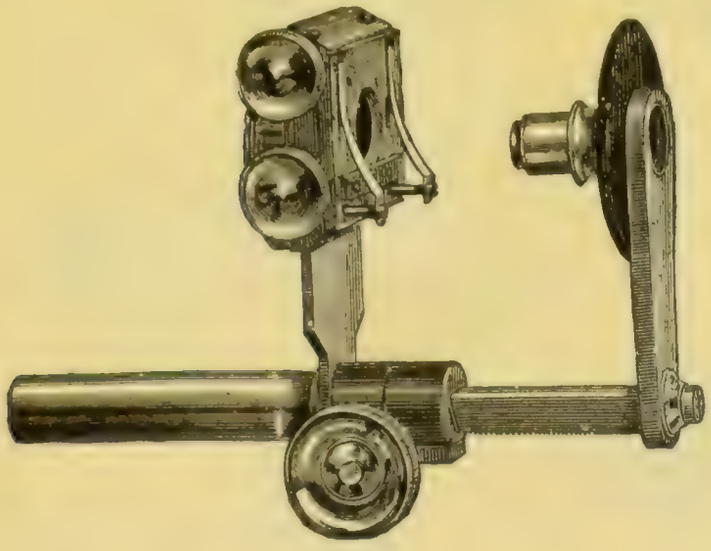


1987C

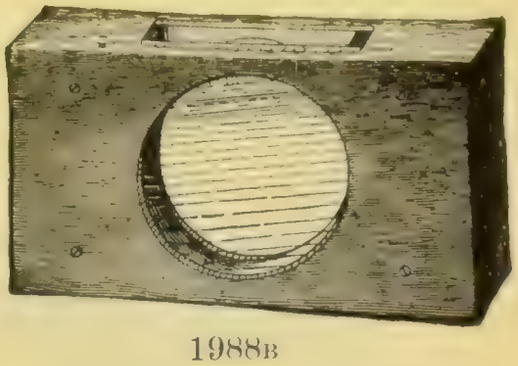
1987B **Brass Tap,** 6-way, with double bye-pass, for use with a pair of Lanterns... ... ... £0 15 0

1987C **Portable Screens,** Bamboo, with Brass Connecting Screws, Corner Pieces, and Pulley Wheels—

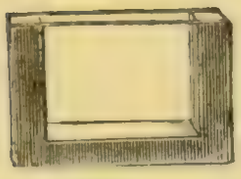
Size of Stand.	Which will also make				
8 ft. square...	3 and 5 ft.	...	...	...	1 16 0
10 ,, ...	3, 5, 6 and 8 ft.	...	...	...	2 2 0
12 ,, ...	3, 6, and 9 ft.	...	..	..	2 5 0
14 ,, ...	4, 6, 8, 10 and 12 ft.	...	...	..	3 7 6
16 ,, ...	4, 6, 8, 10, 12, and 14 ft.		...	...	3 17 6
20 ,, ...	4, 6, 8, 10, 12, 14, 16, and 18 ft.		...	...	4 11 6



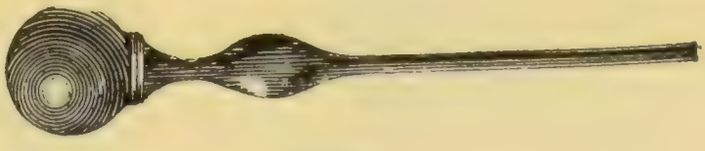
1988A



1988B



1988C



1988D

1988A **Lantern Microscope,** fitted with revolving Diaphragm and Mechanical Stage, working vertically and horizontally, with Sub-stage Condenser fitted in a telescopic Sliding Brass Tube for adjustment of focus, one best quality Double Achromatic Objective in Brass Case, the whole fitted in Polished Mahogany Case fitted with Lock and Key ... £5 5 0

,, with Fine Adjustment to Microscope ... extra 0 7 6

1988B **Alum Trough,** for Microscope 0 3 6

1988C **Glass Trough,** for showing animalculæ in water ... 0 4 6

1988D **Glass Pipette,** with Rubber Ball for moving liquids or animalculæ 0 1 0

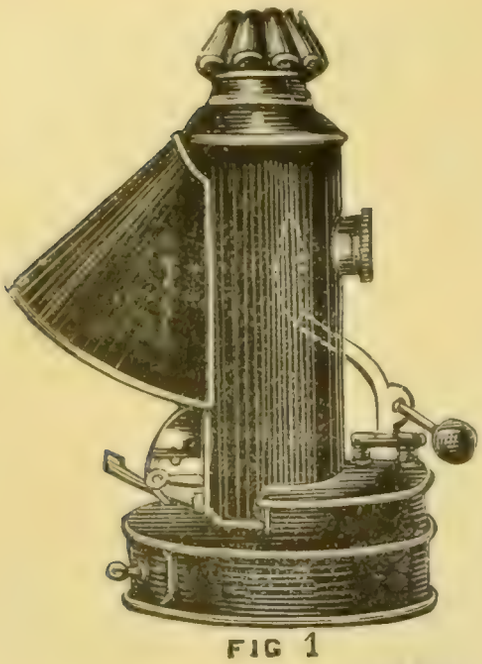


FIG 1

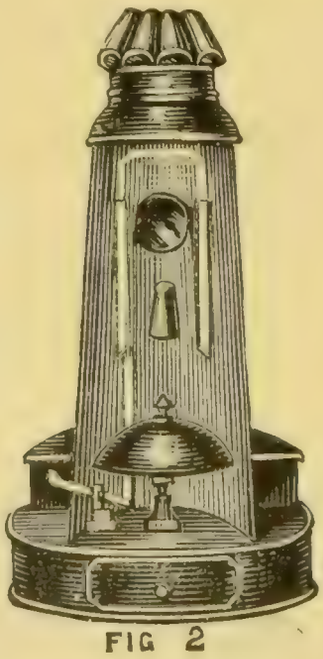
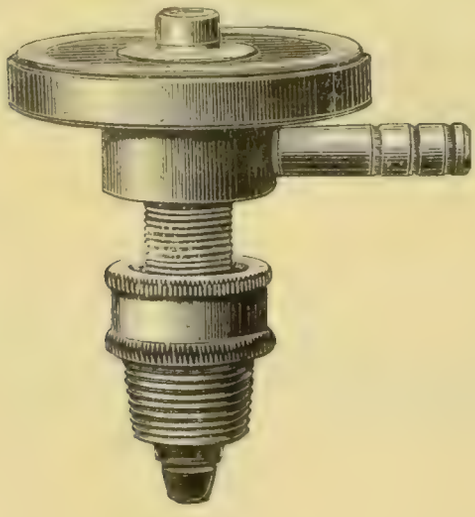


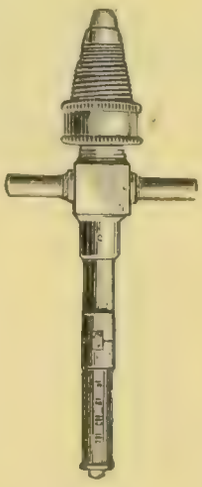
FIG 2

1988E

1988E **Reading Lamp,** for Lecturer's use, to burn Benzoline or other mineral oils, will last 4 hours, and requires no snuffing, which is so common with other Lamps £0 12 6



1988F



1988G

1988F **Suiter's High Pressure Gas Regulator** £1 0 0

Extra Connecting Piece ... ... each 0 3 0

,, ,, ,, with left hand screw... ,, 0 3 9

1988G **Pocket Pressure Gauge** 1 0 0

In ordering above Gauges please state the kind of screw to which it is required to be fixed.

1988H **Schäffer's Steam Pressure Gauges,** 4 in. diameter, for use with Oxygen Cylinders 2 2 0



1993

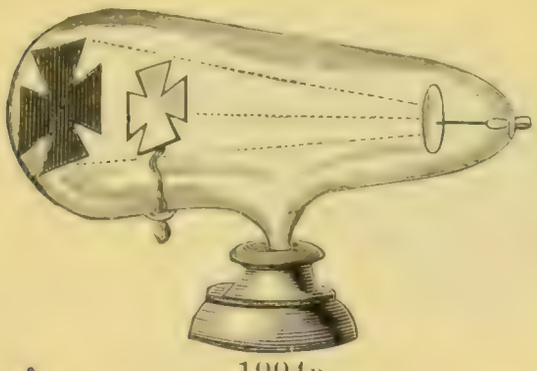


1994

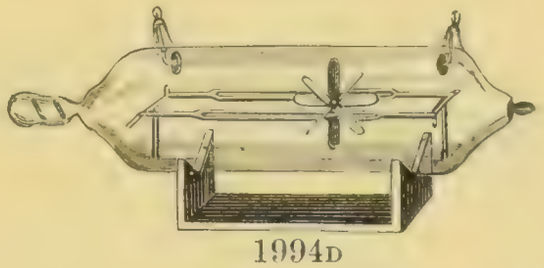


1994A

1993	**Radiometer,** Crooke's	£0	4	9
1994	,, ,, double	0	10	0
1994A	**Set of Two Tubes,** for showing the relative importance of North and South Pole ... ... per pair	1	5	0



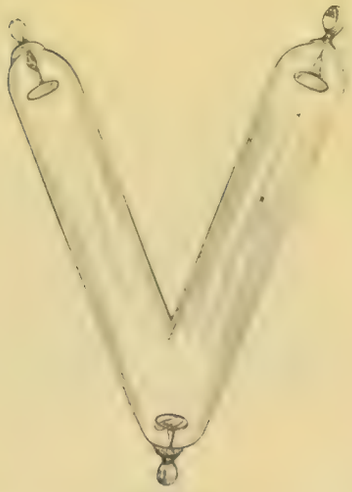
1994B



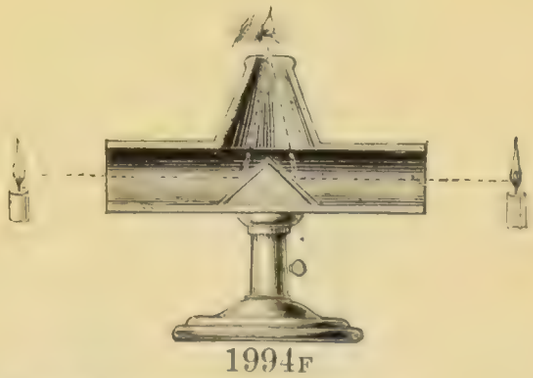
1994D



1994C



1994E

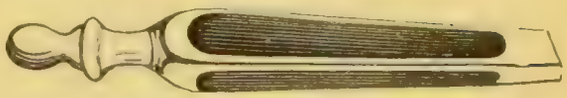


1994F

1994B	**Tube,** with Cross of Aluminium, for Shadow Experiment ...	£1	7	0
1994C	**Cylinder,** to show that the appearance of the rays of light depends on the negative pole	0	11	0
1994D	**Tube,** to illustrate mechanical action of radiant matter ...	1	10	0
1994E	,, to show that the rays of light only move in direct lines	0	11	0
	(Other patterns of Crooke's Tubes can be supplied to order.)			
1994F	**Brass Tube,** with Disc and Screen, to show that all bodies reflect light	0	7	6



1995



1996

1995 **Tourmaline Forceps,** or Pincette, consisting of 2 Tourmalines mounted in 2 Rings of Silvered Copper, coiled to form a Spring £0 17 6

1996 **Glass Prism,** Cut and Polished, to contain Indigo Solution, for examination of the Colours of Blowpipe flames ... 0 3 9

1996A **Selenite Objects,** mounted in Mahogany Frames, for use with Polariscope—

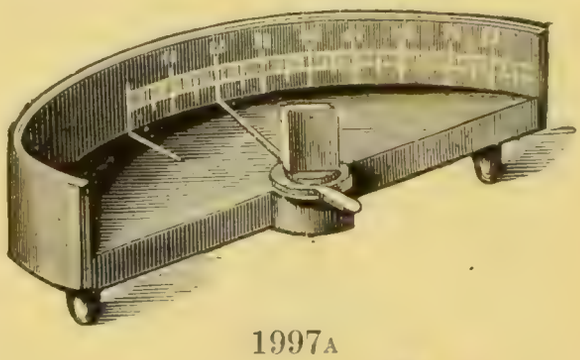
Cube ...	...	...	...	...	0 4 6
Star, six-pointed ...	...	...	...	..	0 10 0
Tulip ...	...	...	...	...	0 15 0
Chameleon	...	...	...	...	0 10 0
Butterfly	...	...	...	...	0 10 6
Parrot ..	...	...	...	...	1 10 0

Other designs to order.

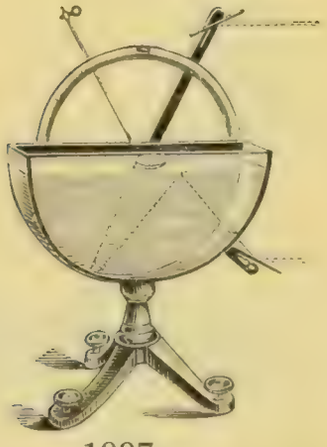
1996B **Objects for Polariscope,** Horn, Quill, Benzoic Acid, Granite, &c. ... ... each 0 3 6



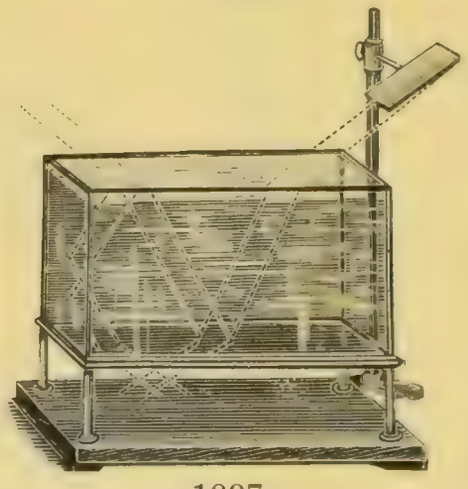
1997



1997A



1997B



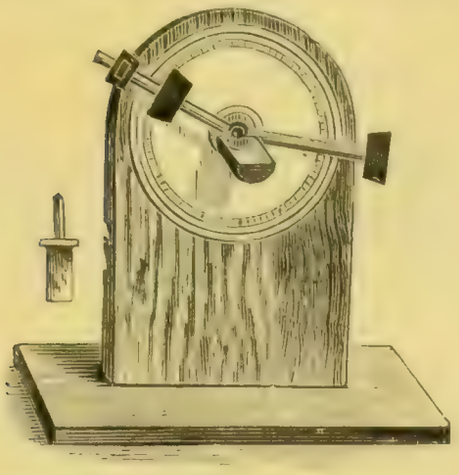
1997C

1997 **Tray,** Semicircular, 24 in. diameter, 4 in. deep, with Glass Window for reflection and refraction £0 8 6

1997A ,, Semicircular, with Revolving Mirror, and Divided Circle 0 17 6

1997B ,, Semicircular, for the refraction of liquids, with 2 Mirrors for total reflection and dispersion with the assistance of the Fluorescent Fluid, diameter of Glass Vessel 10 in., mounted on Stand 4 10 0

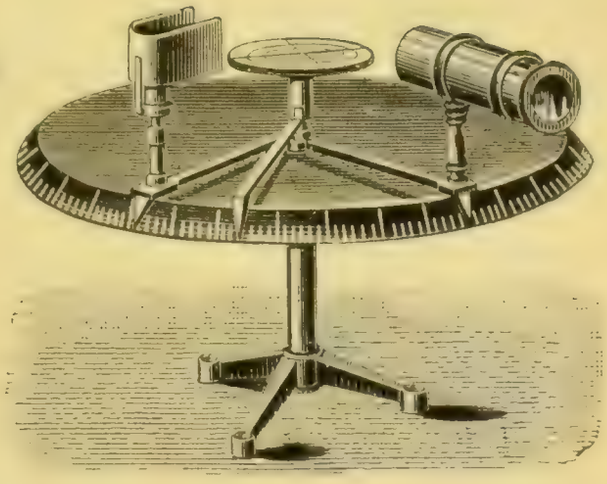
1997C **Rectangular Glass Trough,** for reflection and refraction of light 2 17 6



1998



1998A



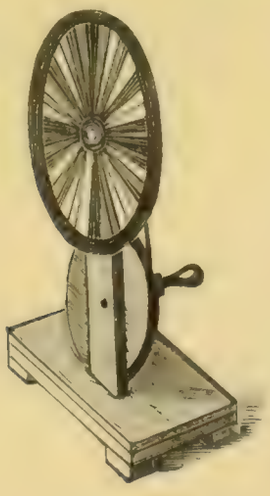
1998B

1998 **Apparatus,** for illustrating reflection and refraction of light, Graduated Circle on Mahogany Stand, with 2 Brass Slides which move round the circumference, Semi-circular Vessel in the centre for water, with Mirrors and Screens £1 5 0

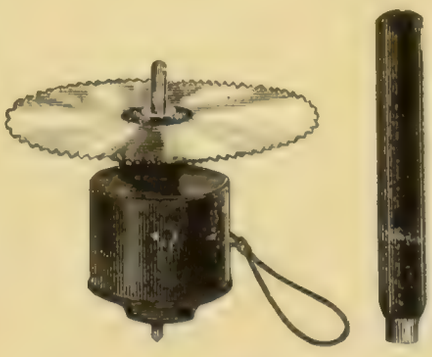
1998A **Goniometer,** Weinhold's, to demonstrate the laws of reflection and refraction, also for finding the angles of Prisms, complete with Lenses, Glass Vessel for Fluids, 2 Telescopes, and Prisms for Spectrum Analysis ... 18 10 0

1998B **Goniometer,** another form 4 4 0

451 ,, simple form (*see page* 63) 0 7 6



1999



1999A

1999 **Newton's Disc,** on Mahogany Stand £1 10 0

1999A ,, mounted on Brass Spinning Top ... 0 5 6



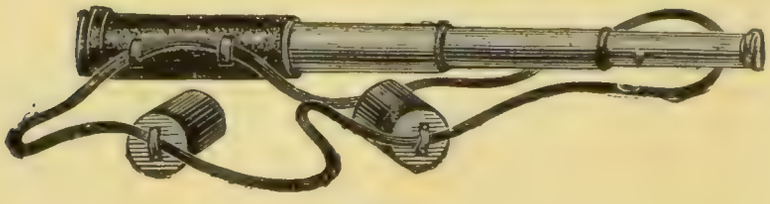
2000

2000 **Kallistochrome, or Colour Top,** for illustrating the beautiful automatic changes of colour, with 12 Coloured Discs, Porcelain Cup, Mask, and Wood Handle ... £0 6 6

2001 **Two Tin Plates,** mounted on Stand, to show absorption ... 0 4 0

2002 **Mitscherlisch's Apparatus,** 8 Glass Tubes, with Platinum Electrodes for Spectrum Analysis 0 15 6

TELESCOPES.



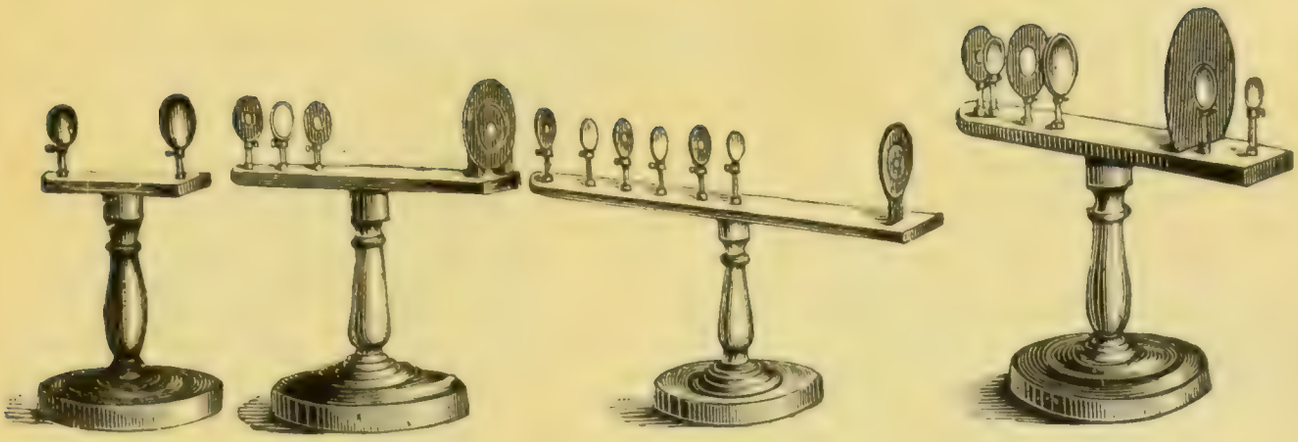
2003

2003 **Telescope,** Tourists', English make, covered with hard, black-grained Leather, with Caps and Sling—

12	in.	3	draw,	closing to	6	in.	When open	15	in.	Diam. $1\frac{1}{4}$ in.	£1 5 0
14	,,	2	,,	,,	8	,,	,,	19	,,	,, $1\frac{5}{8}$,,	1 12 6
18	,,	3	,,	,,	8	,,	,,	23	,,	,, $1\frac{3}{8}$,,	1 15 0
24	,,	3	,,	,,	10	,,	,,	30	,,	,, $1\frac{5}{8}$,, shaded	2 10 0
30	,,	4	,,	,,	11	,,	,,	36	,,	,, $2\frac{1}{8}$,, ,,	3 17 6

2003A **Telescope,** Astronomical, 24 in. long, Polished Brass Body, with 2 in. Object Glass, Sliding Adjustment to Focus, Celestial and Terrestrial Eye Pieces, mounted on Brass Pillar on Iron Tripod Stand, packed in Whitewood Case, complete 3 7 6

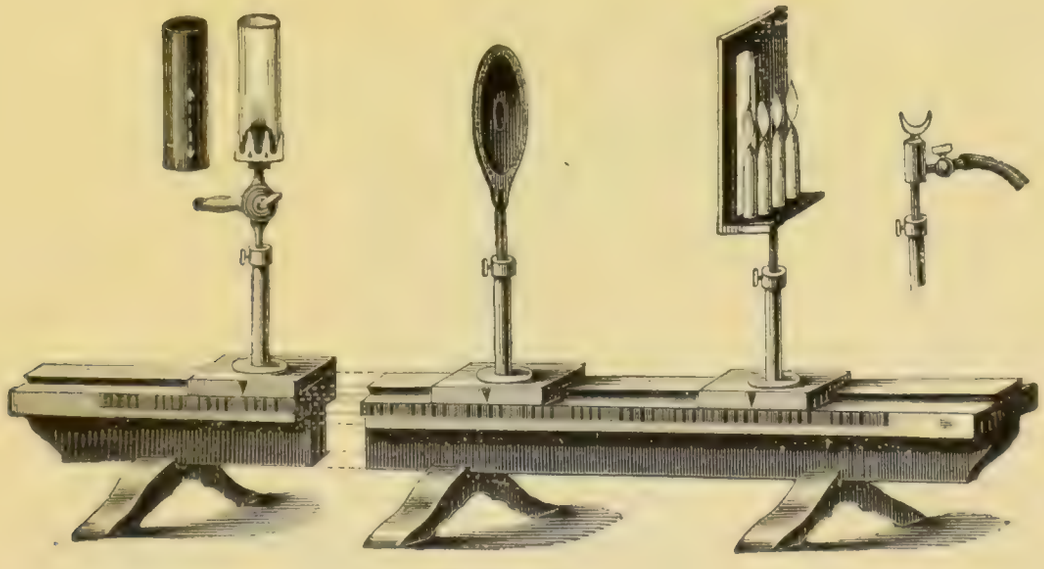
2003B **Telescope,** Astronomical, fitted with Rackwork Adjustment to Focus 4 4 0



2003c 2003c 2003c 2003d

2003c **Telescope,** Model, mounted on Mahogany Stand, to demonstrate the Galilean, Astronomical, and Terrestrial Telescopes, set of 3 £1 15 0

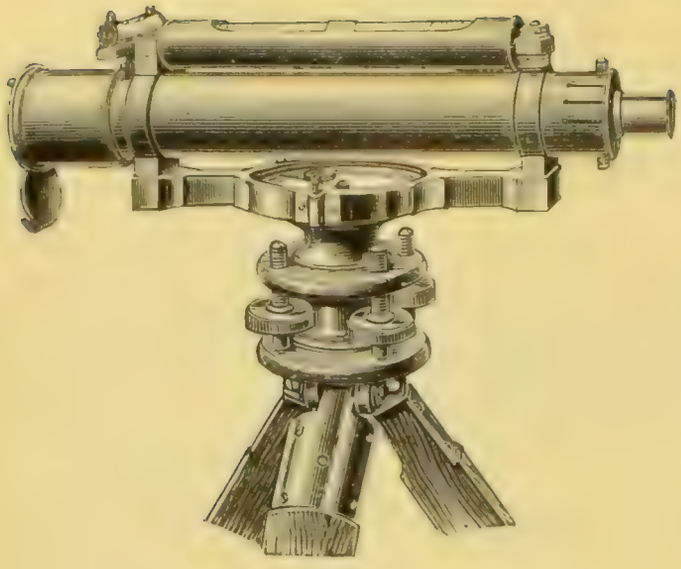
2003d **Microscope,** Model, mounted on Polished Wood Stand ... 0 14 6



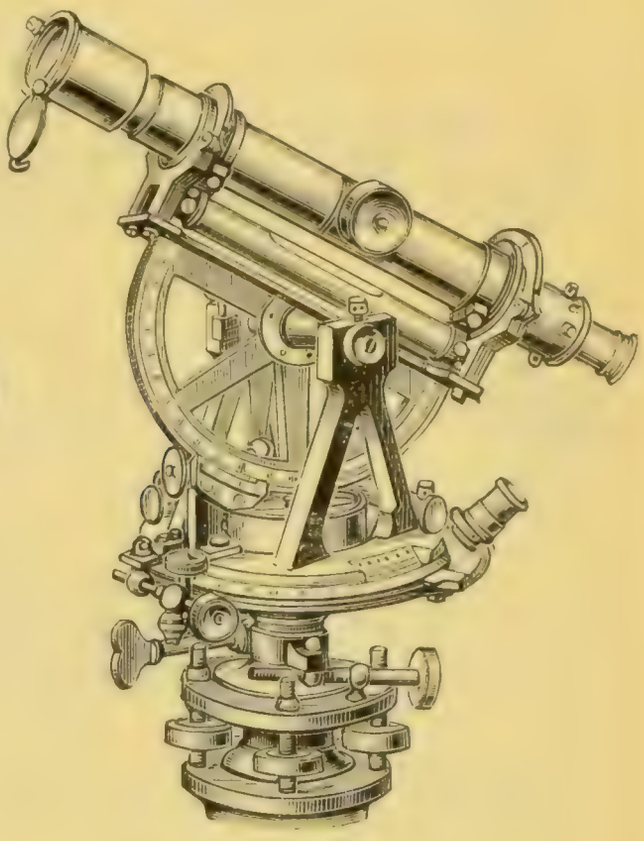
2003e

2003e **Optical Bench,** Divided Scale 1 metre long, with 8 Brass Riders, and 3 Double Convex and 1 Double Concave Lenses, Brass Slit with Micrometer Screw, Mirror, White Screen, and 1 Glass Prism, complete with Petroleum Lamp, mounted on Mahogany Stand £7 10 0

2003f ,, Cheaper form 3 10 0



2003G



2003J

2003G **Entire Level,** of improved form, with Telescopic Body 10 in. long, Object Glass $1\frac{5}{8}$ in. diameter, with Shade, extra large Parallel Plates, Sockets to Adjusting Screws, increased length of Centre, packed in Mahogany Case, with Extra Deep Eye Piece, Capstan Pin, Screwdriver, and Round Tripod Stand £12 10 0

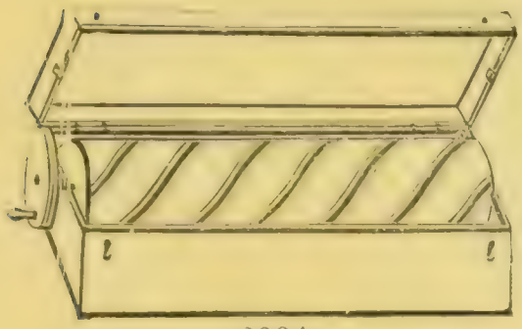
2003H **Y Level,** of improved form, with Telescopic Body 10 in. long, Object Glass $1\frac{1}{4}$ in. diameter, Sockets to Parallel Plate Screws, Clamp and Tangent Screw Adjustment to the Centre, packed in Mahogany Case, with Extra Deep Eye Piece, Screwdriver, Capstan Pin, and Round Tripod Stand 14 10 0

2003J **Theodolite,** 4 in., best quality, divided on Silver, in Mahogany Case, with Tripod Stand, complete 24 0 0

2003K **Steel Tapes,** feet or metres, in Leather Case, Folding Handle—

Width of Tape	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	in.
Length „	50	100	50	100	ft.
	30/	55/	37/6	65/	each

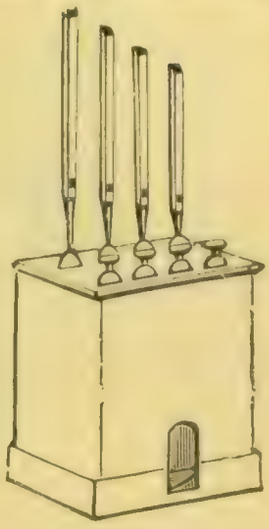
EXPERIMENTS WITH SOUND.



2004

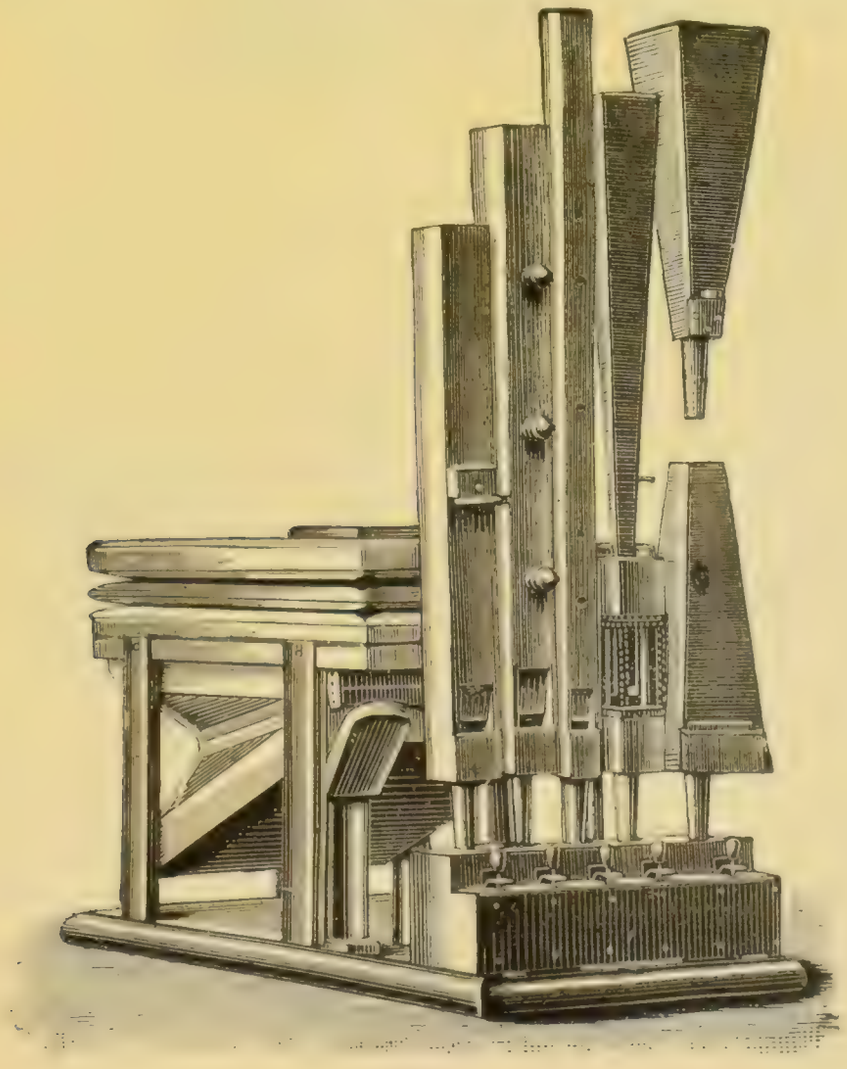


2006

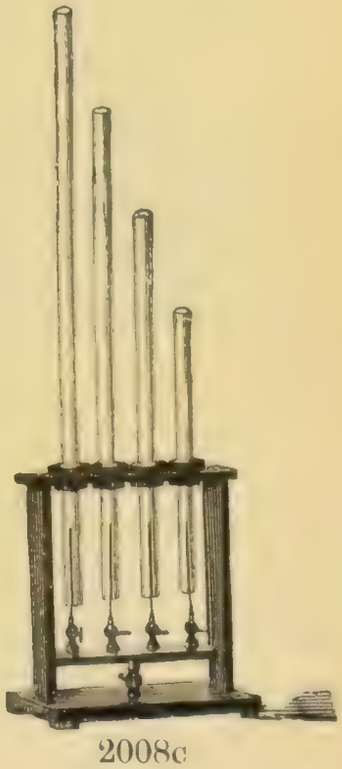


2007

2004	**Apparatus to show the Transmission of Undulations,** Wooden Roller about 15 in. long, in Stained Wood Case	£0	12 6
2005	,, ,, **Action of the Larynx,** Boxwood ...	0	7 6
2006	**Box** for Vortex Rings	0	6 6
2006A	**Model of Ear,** small size	0	16 0
	,, ,, large ,, ...	1	5 0
2007	**Double Bellows and Set of 4 Organ Pipes, G to C,** mounted on Swiss Pine and Varnished ...	5	10 0
2008	,, ,, Set of 8 Pipes, showing complete Octave, with Ivory Keys, mounted on Deal Stained Case	12	10 0



2008A



2008C

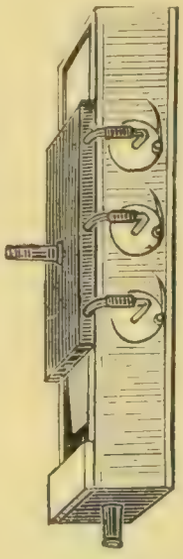
2008A **Double Bellows**, with Regulator, 5 Keys to open the Valves, with arrangement for 5 Pipes, and also side opening for a Horizontal Pipe, complete with 2 Weights for use with Bellows £3 5 0

2008B ,, Polished Wood, for 9 Pipes 6 6 0

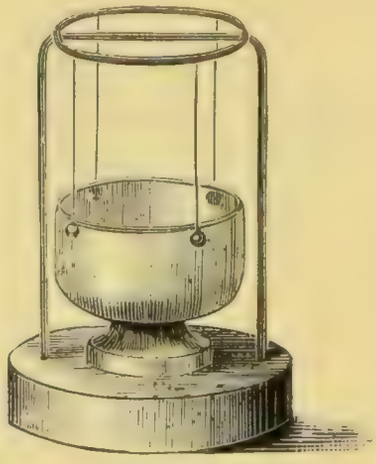
2008C **Harmonicon**, with 4 Glass Tubes, giving 1 Chord, fitted in Iron Stand, with 4 Gas Jets with Stopcocks 1 5 0



2009



2010



2010A

2009 **Organ Pipe**, simple, unpolished ... each 8/6, 12/, 15/ and £1 0 0

,, ,, ,, polished ... ,, 9/6, 13/, 16/ and 1 1 0

2010 ,, ,, Koenig's, Polished Whitewood, for illustrating Nodes and Loops, best make 1 18 6

2010A **Glass Vessel**, mounted on Polished Wooden Foot, to demonstrate the Nodes of Glass Vessels, with 4 Wooden Balls suspended on Brass Stand 0 17 6

2011 **Organ Pipe**, with Glass Front 0 19 0

2012 ,, ,, Set of 8, Swiss Pine, complete Octave ... 2 15 0

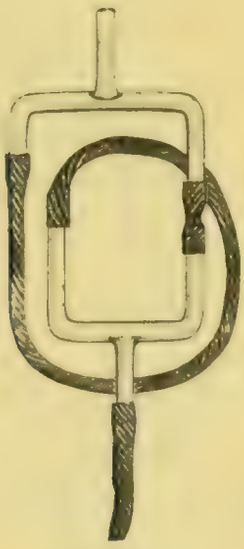
2013 **Reed Pipes**, with 2 Horns 1 10 0

2014 ,, ,, Spotted Metal, Oboe or Clarionet ... each 0 9 6

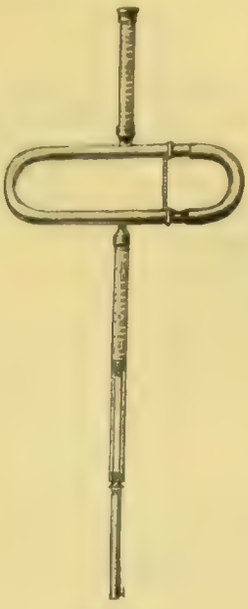
2014A **Glass Pipe**, Circular, with Regulating Membrane for demonstrating Nodes 0 18 6



2015



2015A



2015B

2015 **Hopkin's Forked Tube,** to show the interference of sound ... £0 6 0

2015A **Quincke's Glass Interference Tube,** fitted with Rubber Tubing 0 3 6

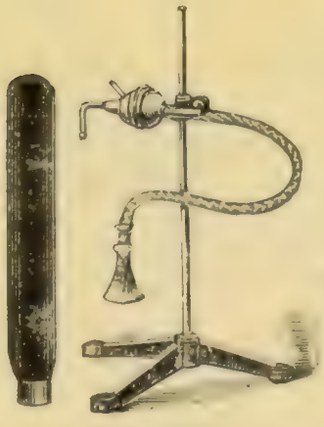
2015B **Interference Tubes,** with Moveable Bow, to show Kundt's Figures by means of Rods and Clamps 1 15 0

2016 **Hydrogen Bottle,** to show the effect of a jet of gas burning in a tube... ... ... 0 2 6

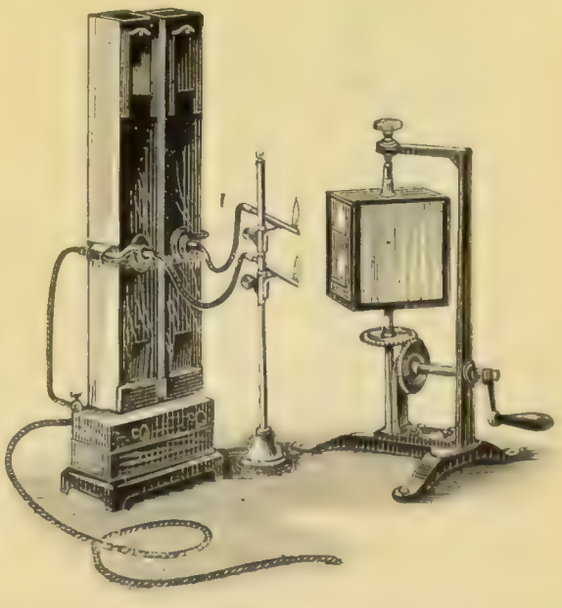
2017 **Glass Tubes,** of different lengths and diameters, to be used with hydrogen jet 0 2 0



2018



2019

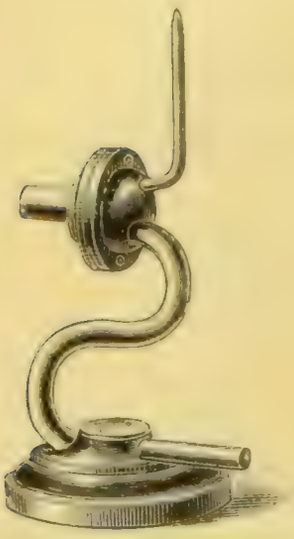


2019A

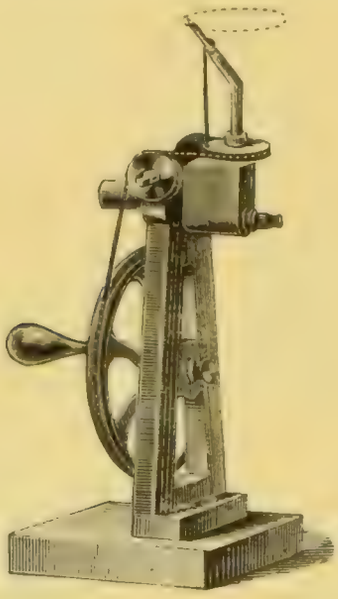
2018 **Humming Top,** Brass, with Brass Plate, pierced with 2 rows of Holes, and Toothed Edge £0 5 6

2019 **Manometric Flame Apparatus** 0 17 6

2019A **Koenig's Apparatus,** for comparing 2 Organ Pipe Notes by means of the Manometric Flame, consisting of 5 Pipes mounted on a Wind Chest, with Valves for 2 Pipes, Stand with 2 Manometric Gas Jets, and a Rotating Cubical Mirror, complete 10 10 0



2019B

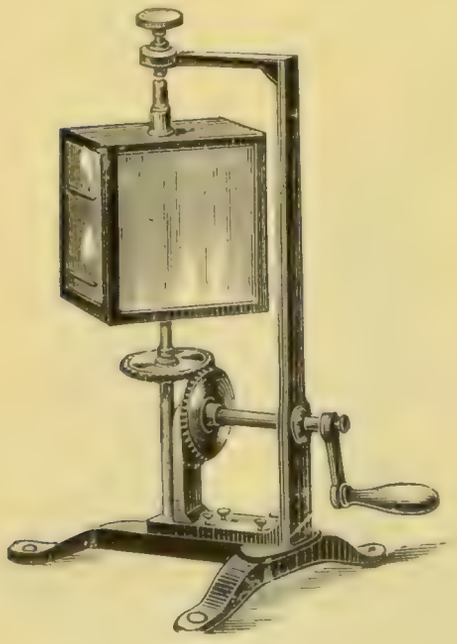


2019C

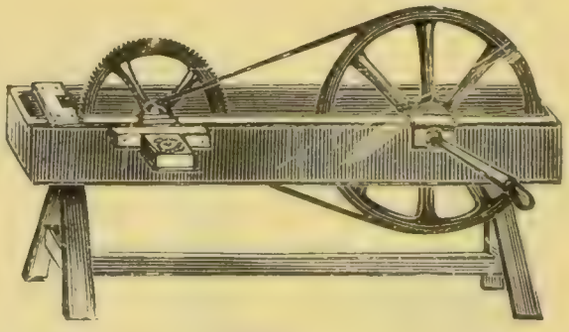


2019D

2019B	**Weinhold's Gas Flame Manometer**	£0	12 0
2019C	,, ,, ,, with Revolving Burner, mounted on Stand	2	10 0
2019D	**Rotating Mirror,** Pfaundler's	1	8 0
2019E	,, ,, ,, with Clockwork	3	10 0

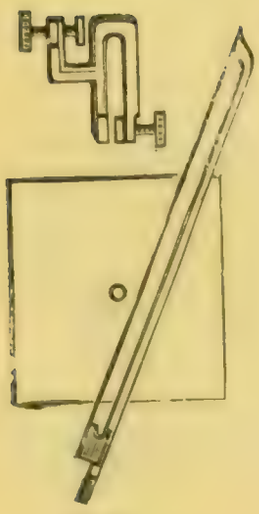


2019F

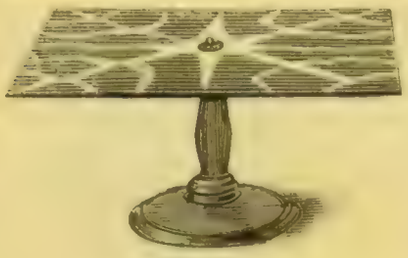


2020

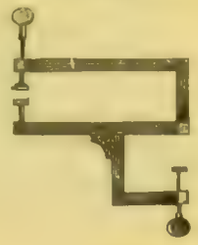
2019F	**Rotating Mirror**, Pfaundler's, with Rackwork	£2	10 0
2020	**Savart's Toothed-Wheel Apparatus**, with 2 Wheels, fine and coarse, on Polished Mahogany Stand	2	10 0
2021	,, With Indicator	3	3 0
2022	**Trough**, Stained Black Wood, with Plate Glass Front— 4 ft. × 6 in. × 6 in.	0	12 0
2023	,, Zinc, circular, 24 in. × 18 in.	0	16 0
2024	,, ,, 18 in. × 18 in.	0	12 0
2025	,, ,, 24 in. × 12 in. × 18 in.	0	18 6
2026	**Wooden Block,** for above, $5\frac{3}{4}$ in. × 4 in. × 4 in., with Handle	0	1 6



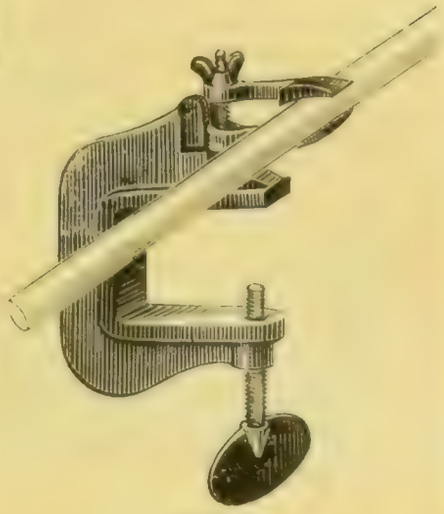
2027



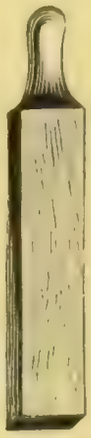
2027B



2030

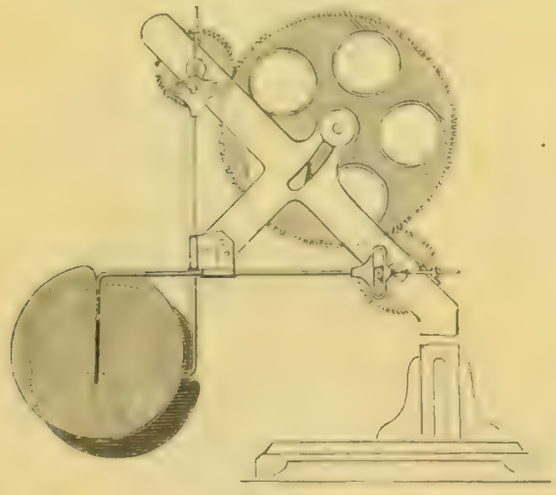


2030A

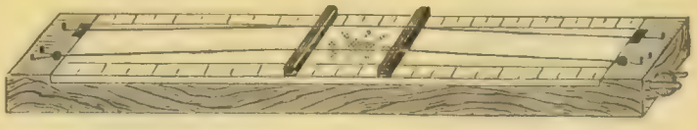


2031

2027	**Clamp,** Gun Metal, with Bell Metal Plate, 11 in. square, and Bow to show Chladnis Figures	£0	15 0
2027A	Same as above, with Iron Clamp	0	13 6
2027B	**Bell Metal Plate,** 11 in. square, mounted on foot, for showing Chladnis Figures	0	15 0
2027C	**Bass Bow,** for use with above	0	4 0
2028	**10 Glass Plates,** different forms	0	10 0
2029	**Gun Metal Clamp,** with 10 Glass Plates	0	17 6
2030	Same as above, with Iron Clamp	0	16 0
2030A	**Clamp,** for holding Tubes for Longitudinal Vibrations ...	0	15 0
2031	**Cylinder,** with Moveable Piston, to show the effect of Sounding Boxes in increasing the Intensity of Sound	0	7 6



2031A

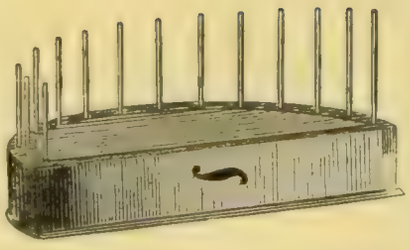


2032

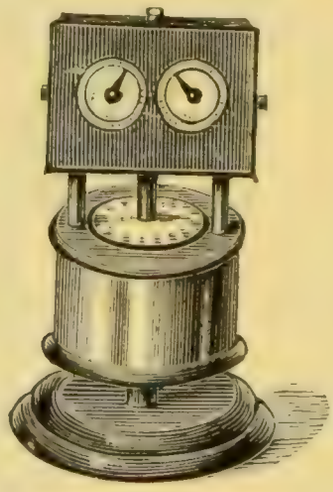
2031A	**Apparatus,** to show Lissajou Curves	£3	10 0
2032	**Monochord,** with 2 Wires, one to be stretched by a weight, the other by a screw, Graduated Scale—Whitewood	0	17 6
2033	,, superior, mounted on Legs, with Key, and Metre Scale—Polished Mahogany	1	17 6
2034	**Iron Weights,** Set of 4, with Ring Handle, consisting of one 20 lb. and three 10 lb.	0	11 6
2035	**Sounding Board,** Deal, 24 in. × 24 in. ... 3/6 and	0	5 6
2036	**Deal Rod,** 12 ft. × 1 in. × 1 in., uncovered	0	1 9
2037	,, 12 ft. × 1 in. × ½ in.	0	1 4
2038	,, round, 6 ft. × ½ in.	0	1 0
2039	**Oak Rod** ,, 6 ft. × ½ in.	0	1 4



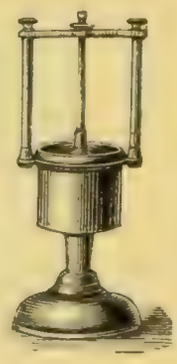
2039A



2039B



2041



2041A

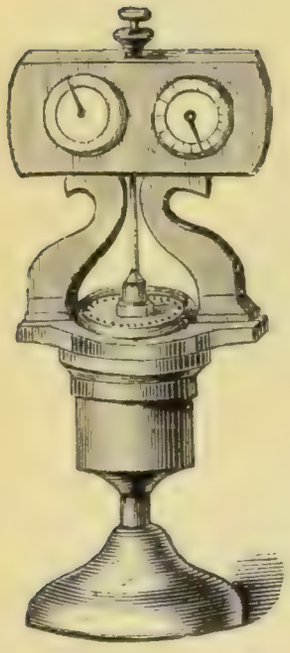
2039A **Apparatus,** to demonstrate longitudinal vibration, consisting of 4 Wooden Rods, tuned to one chord, mounted on Stand £0 7 6

2039B **Model Violin,** to demonstrate transverse vibrations of flexible rods, tuned to the Chromatic Scale, on Sounding Box, with Bow 1 5 6

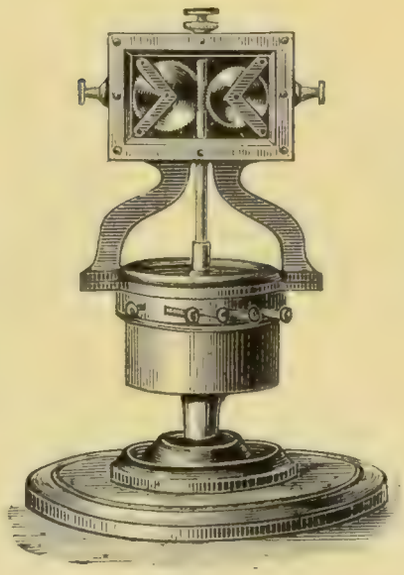
2040 **Brass Tube,** 3 ft. × ½ in. 0 1 6

2041 **Syren,** with Indicator for giving number of revolutions ... 2 10 0

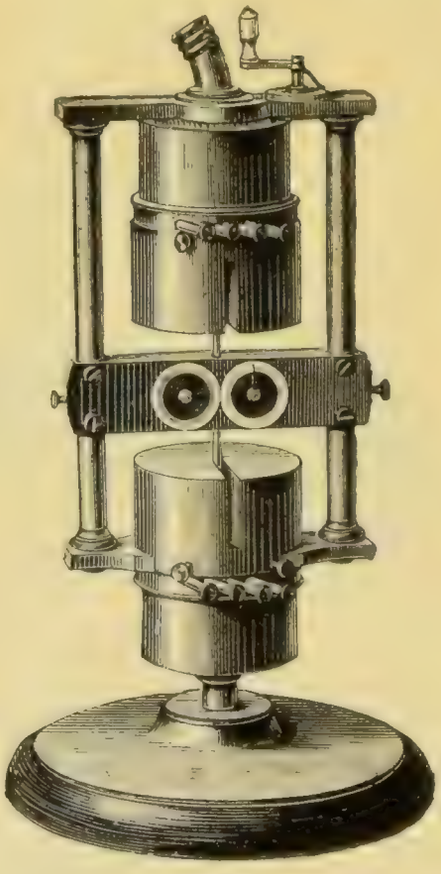
2041A ,, simple form, Cagniard-Latour's 0 18 0



2041B



2041C



2041D

2041B **Syren,** with Indicator £3 3 0

2041C ,, Dove's, with 4 rows of Holes 5 0 0

2041D ,, Double, Helmholtz, with visible Indicators, highly finished, and mounted on Polished Mahogany Base ... 14 0 0

2042 **Tubes,** Japanned Tin, 36 in. × 4 in.... ... each £0 3 6

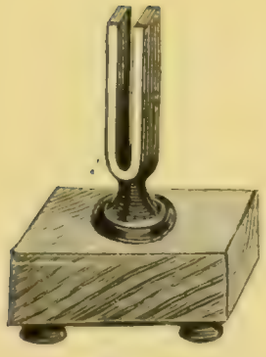
2043 **Tuning Fork,** small, Blue Steel, any pitch 0 1 0

2044 **Two Tuning Forks,** of different pitch, C 256 and C 512, Tapped for Screwing into Resonance Boxes 0 6 6

2044A **Tuning Forks,** of different pitch, of highly Polished Steel, Tapped ... each, according to size, 7/6, 9/, 16/, 21/ and 2 0 0

2044B **Resonance Boxes,** for the above ... each 3/6, 4/6, 5/ and 0 6 0

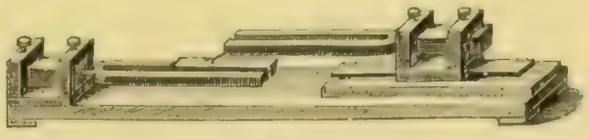
2045 **Two Tuning Forks,** mounted ... ... 15/ to 2 2 0



2046



2053



2050B



2054

2046 **Two Tuning Forks,** with small Mirrors attached, mounted £0 16 0

2047 **Tuning Forks,** Polished Steel, mounted on Resonance Boxes, each 6/, 10/6 and 0 15 6

2048 ,, ,, large, C, 64 vibrations 1 17 6

2049 ,, ,, untuned 1 2 6

2050 ,, ,, Set of 13, Chromatic, C to C, in Case ... 1 5 0

2050A ,, ,, with Point attached, giving 128 vibrations ... 1 1 0

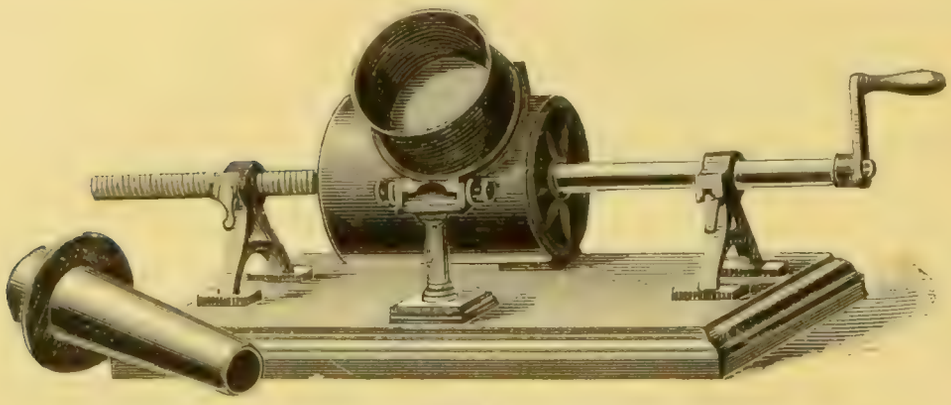
2050B ,, ,, to demonstrate the vibration of 2 Tuning Forks 4 0 0

2051 **Tonometer,** consisting of 65 Forks, commencing at 256 and ending at 512 ... ... 13 10 0

2052 **Leather Case** for ditto ... ... extra 3 0 0

2053 **Speaking Trumpet,** Japanned Tin 0 3 0

2054 **Trevelyan's Rocker,** with Lead Block 0 12 6

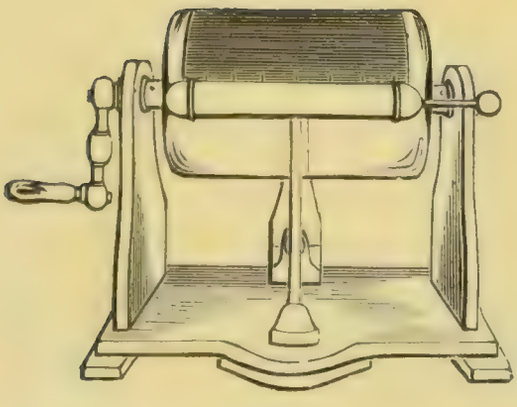


2054A

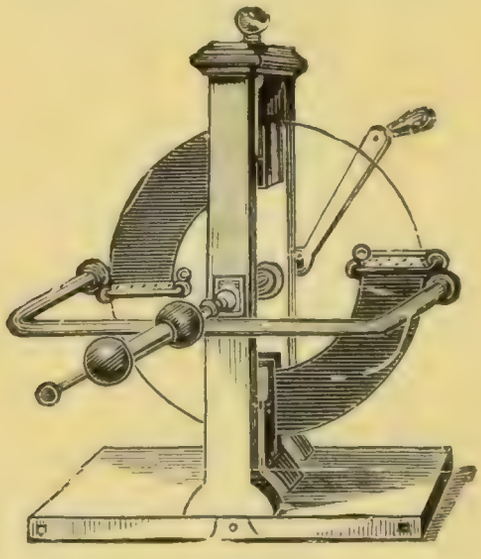
2054A **Phonograph,** on Polished Mahogany Base, Cylindrical Brass Drum and Sounding Box, Mica Membrane, with Micrometer Screw for adjustment, and Cone, complete... ... ... £7 10/ and £10 0 0

Special Foil, for above, in packets containing 20—
per packet 2/6 and 0 3 6

ELECTRICAL APPARATUS.



2055



2058

2055 **Electrical Machine,** Cylindrical, on French Polished Stand, with Brass Conductor—

Dimensions of Cylinder on the rub 7 inches × 5 inches ... £1 1 0

2056 ,, ,, ,, 10 ,, × 6 ,, ... 1 8 6

2057 ,, ,, ,, 11 ,, × 7 ,, ... 1 15 0

2058 **Electrical Machine,** Stout Glass Plate, on French Polished Mahogany Stand, with Brass Conductor—

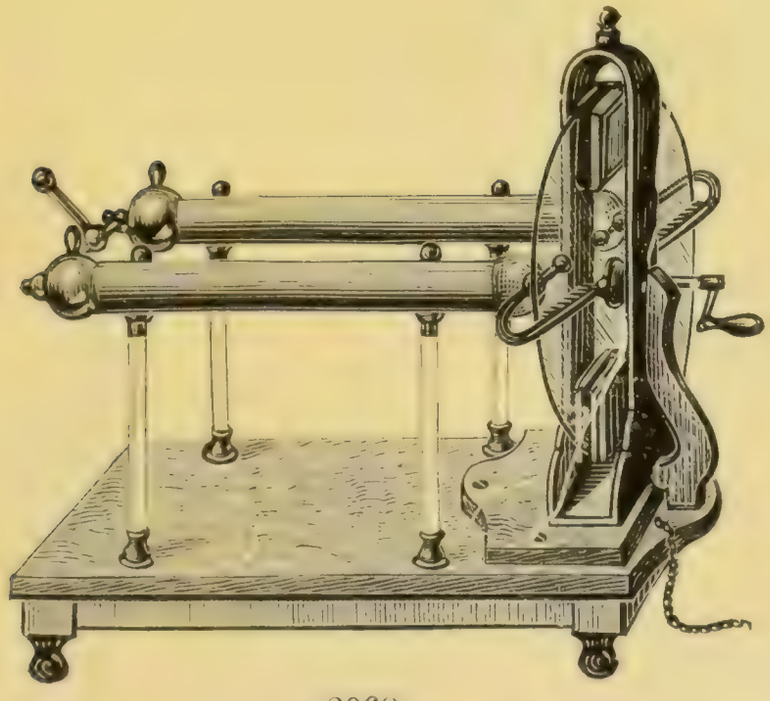
	Diameter of Plate	12	inches	...	...	...	£2	15	0
2059	,,	,,	15	,,	...	...	...	3	15	0
2060	,,	,,	18	,,	...	...	...	4	15	0
2061	,,	,,	20	,,	...	...	...	6	10	0

2061A **Stout Glass Plates** for above, with holes in centre—

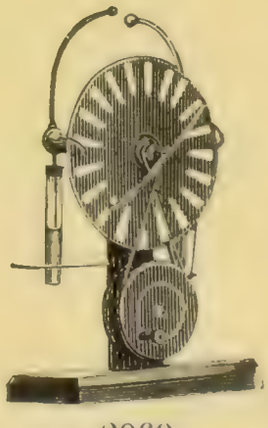
Diameter	12	15	18	20 inches
	7/6	10/6	15/	18/ each

2061B **Stout Vulcanite Plates** for above, with holes in centre—

Diameter	12	15	18 inches
	13/	18/6	30/ each, $\frac{1}{4}$ in. thick
	20/	30/	40/ each, $\frac{3}{8}$ in. thick



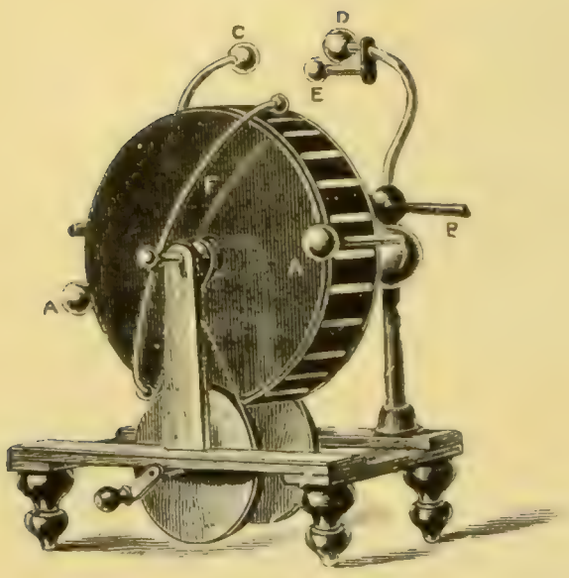
2068



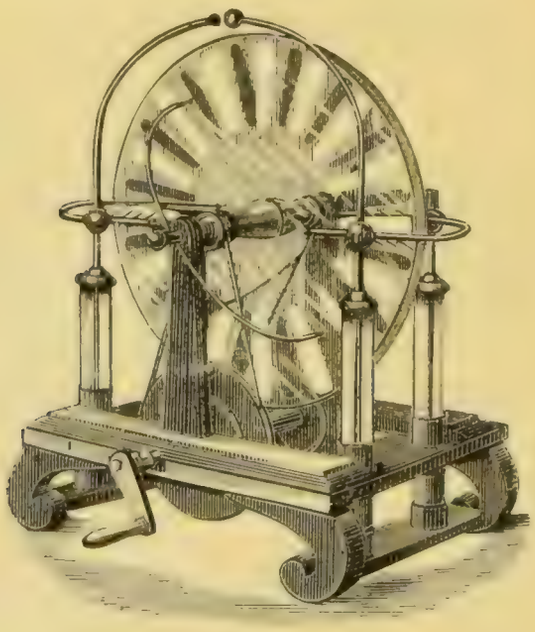
2069

2068 **Electrical Machine,** Ramsden's, on Mahogany Stand, with 2 Brass Conductors, diameter of Plate 18 in.... ... £5 0 0

2069 **Electrical Machine,** Ebonite, Plate 8 in. diameter, giving Spark about 1 in. The great advantage in these machines is that they can be used in damp weather, which does not affect them in the same manner as Glass Cylinders or Plates 1 1 0



2070



2072

2070 **Electrical Machine**, Wimshurst's, with Ebonite Cylinders—

9 inches, giving Spark about 4 inches							£3	12 6
12	,,	,,	,,	,,	6	,,	5	5 0
15	,,	,,	,,	,,	8	,,	7	10 0

2071 ,, ,, with Double Ebonite Cylinders, giving about double the power of the Single Cylinders—

$6\frac{1}{2}$	9	12 inches
£2 10/	£4 4/	£6 6/

2072 **Influence Electrical Machine**, Wimshurst's, Glass Plates, fitted on Mahogany Stand—

Diameter of Plates	8	12	16 inches
	25/	60/	87/6 each

2073 **Glass Plates,** drilled hole in centre—

Diameter	8	12	16 inches
	2/	3/	6/ per pair

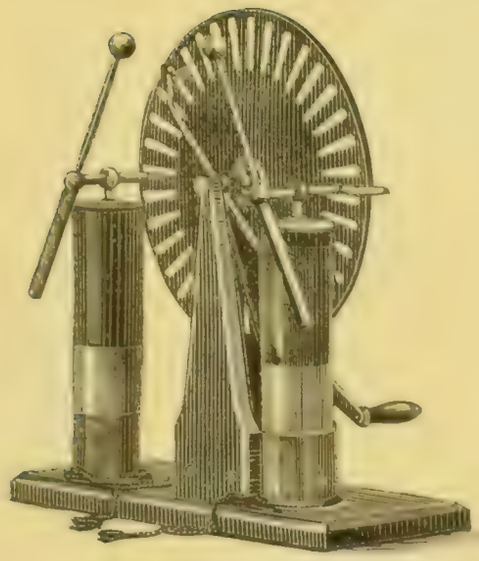
2075 ,, ,, with Sectors of Tinfoil and varnished, and fitted with Bosses ready for use—

8	12	16 inches
7/6	12/6	21/ per pair

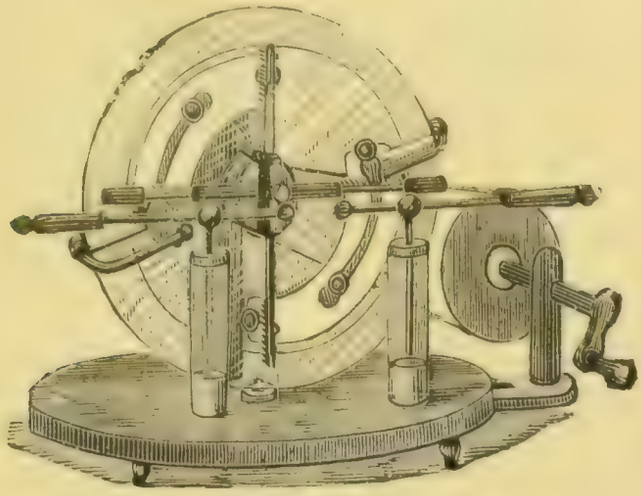
2076A **Electrical Machine,** Wimshurst's, with new Compound Ebonite Plates—Diameter 12 16 inches

£3 10/ £4 15/

2077 **Wire Brushes** ... ... per doz. £0 2 0



2077A



2087

2077A **Electrical Machine**, Wimshurst's, best finish, with Ebonite Plates, all parts Nickel Plated—

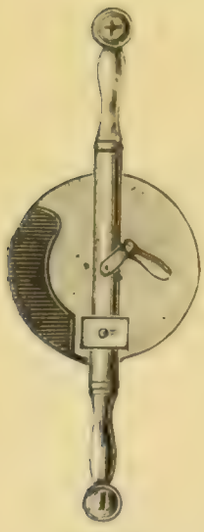
8	10	13	16	18½ inches	
4	5	6	8	9	,, length of Spark
£2 12/6	£3 15/	£5 5/	£9 10/	£13 each	

2087 **Electrical Machine,** Voss', self-charging, 1 fixed and 2 rotating Plates, ordinary quality—

Diameter 10¼	12¼	14¼ inches
£2 15/	£4 4/	£5 10/ each

2087A ,, Best quality—

Diameter 10¼	12¼	14¼ inches
£4 15/	£7	£8 8/ each



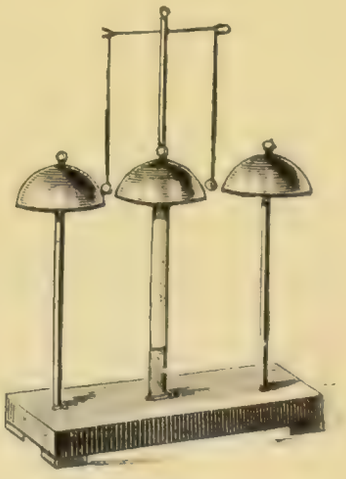
2087B



2089



2090



2090A

2087B **Small Excitor,** for Electrical Machine, for positive and negative electricity £0 19 6

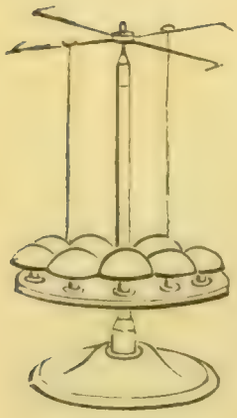
2088 **Electrical Amalgam** ... ... per oz. 0 0 6

2089 **Aurora Flask,** with Brass Cap and Valve for exhaustion ... 0 7 6

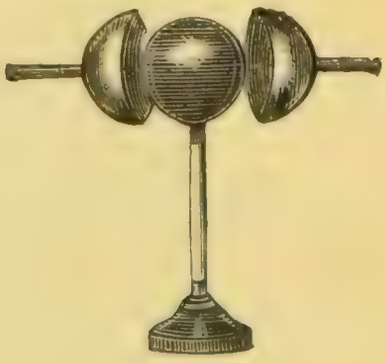
2090 **Bells,** Set of 3, with Rod to suspend from Conductor ... 0 5 6

2090A ,, ,, 3, with Insulating Rod, on Mahogany Stand ... 0 10 0

2091 ,, ,, 5, on Stand, with Electrical Fly or Wheel ... 0 15 0



2092



2094

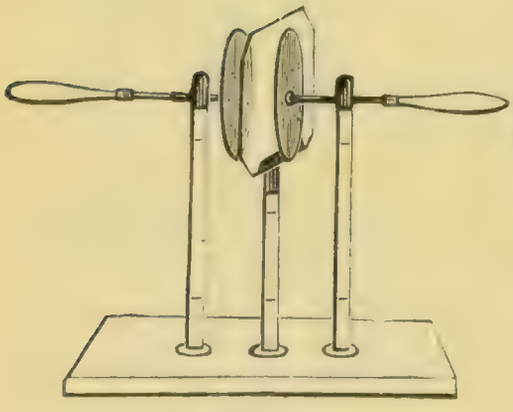


2097

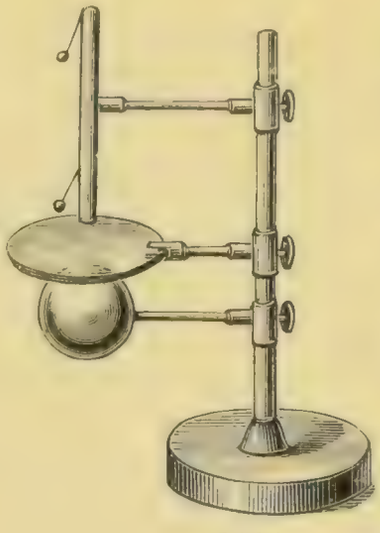


2098

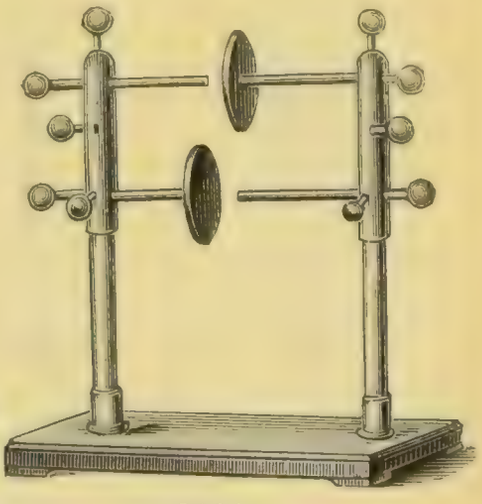
2092	**Bells,** Set of 8, on Stand, with Electrical Fly or Wheel ...	£1	10 0
2093	,, ,, 8, ,, tuned	2	2 0
2094	**Biot's Apparatus,** for illustrating the distribution of electricity on the surface of insulated conducting bodies, consisting of Polished Copper Ball 4½ in. diameter, on insulated Stand, with 2 Spheres 5 in. diam., and insulated Handles	1	10 0
2095	**Brass Balls** ⅜ ½ ⅝ ¾ ⅞ 1 1⅛ 1¼ in. diam. 3d. 3d. 4d. 5d. 5d. 7d. 10d. 1/4 each		
2096	,, ,, with Collar and Wire for Leyden Jar ...	0	1 6
2097	**Bird on Stand,** formed with Spangles of Tinfoil ...	0	5 6
2098	**Bucket and Syphon,** to suspend from Conductor ...	0	3 6
2099	**Cat Skins** ... ... each 3/6, 4/, and	0	5 0
2099A	**Fur Rubbers,** for exciting Tubes ... ... each	0	1 6
2099B	**Fox's Brush** ... ... ,,	0	3 0
2099C	**Silk Rubbers** ... ... ,,	0	1 0
2100	**Chain,** Brass ... ... per yard	0	0 2
	,, ,, Packets containing 1 doz. yards	0	1 6



2101



2101A
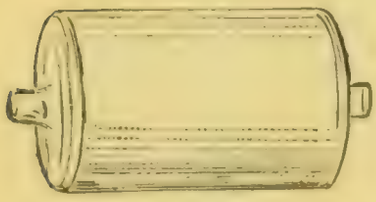


2101B

2101	**Condenser,** 2 Brass Discs and Glass Plate, on Mahogany Stand, with Sliding Movement	£0	17 6
2101A	**Distribution Apparatus,** "Reiss," complete, with Screen ...	1	5 6
2101B	**Weinhold's Apparatus,** on insulated Stand, to show the action of points on positive and negative electricity ...	1	0 0



2102



2111



2103



2104



2105

2102 **Conductors,** Brass, for Cylinder Machines—

6	7	8	9	10 inches
3/6	4/	5/3	6/	8/6 each

2103 to 2105 **Conductors,** 3 different forms, Tinfoil, Cone Cylinder and Sphere, large size, without Stand ... each £0 3 6

2105A **Insulated Stand,** for above 0 3 0

2105B **Conductors,** Set of 3, smaller size, on Insulated Stand, per set 0 7 6

2106 ,, Polished Brass, Glass Insulated Support, on Iron Stand—Spherical 0 12 6

2107 ,, ,, ,, ,, ,, ,, Cylindrical 0 15 0

2108 ,, ,, ,, ,, ,, ,, Conical ... 0 17 6

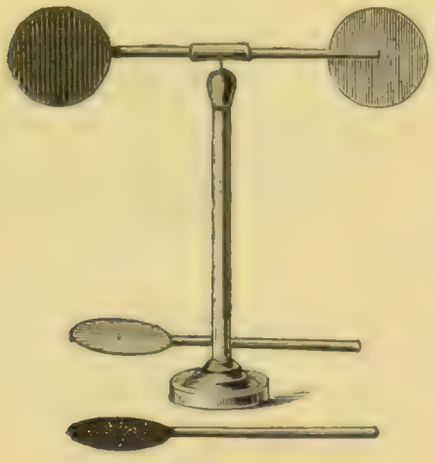
2110 **Cork Figures,** to attract and repel ... ... each 0 1 3

2110A **Pith Figures** ... ... ,, 0 0 8

2110B **Pith** ... ... per bundle 0 0 6

2111 **Cylinders,** Glass, for Machines, dimensions on the rub—

Length	6	6½	7	8	10	11 inches
Diam.	3½	4	5	5½	6	7 ,,
	1/8	2/6	3/	3/6	4/6	6/ each



2111A



2112

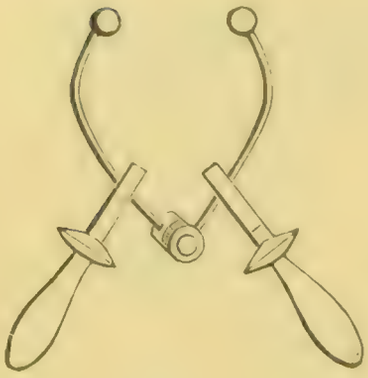
2111A **Apparatus,** for elementary experiments in electricity, consisting of Glass Rod on Insulated Steel Point, with Discs of Glass and India Rubber fixed at opposite ends, Wooden Disc with Handles, Catskin and Amalgam for friction, complete ... £1 10 0

2112 **Discharger,** Plain, with Wood Handle 0 2 6

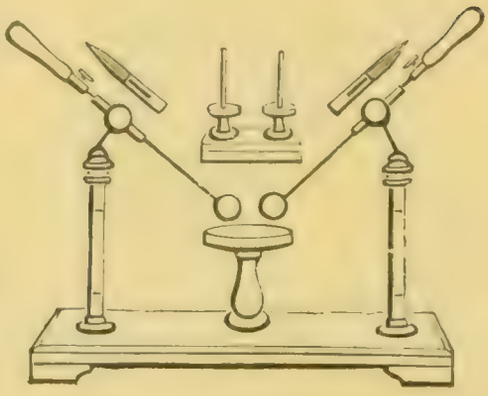
2113 ,, Jointed ,, ,, ... 0 5 0



2114



2115

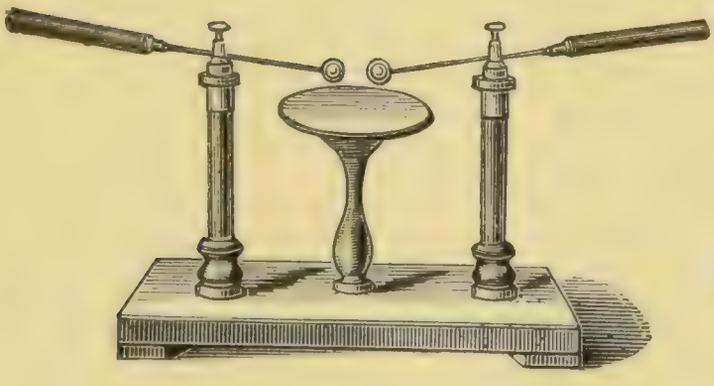


2116

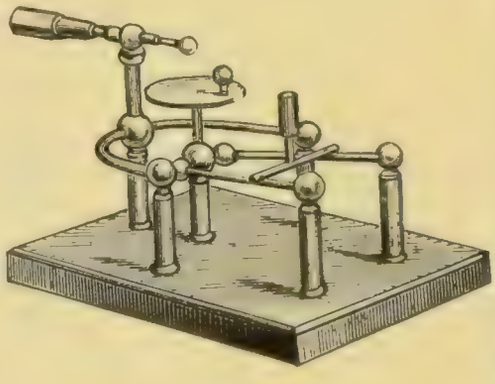
2114 **Discharger,** Jointed, with Glass Handle £0 6 0

2115 ,, with 2 Handles 0 10 0

2116 ,, Henley's Universal, with Insulated Handles, Press, Adjustable Table, and Carbon Holder, for deflagrating metals or exposing substances to frictional or voltaic electricity 1 8 6



2116A



2116B

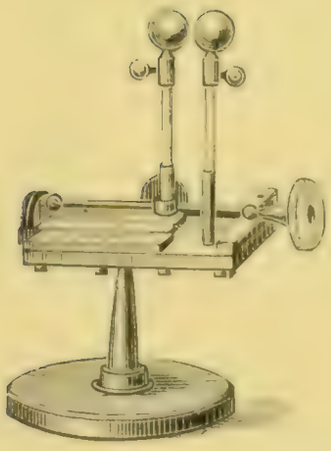


2116C

2116A **Discharger,** Henley's Universal, with Insulated Handles, with Fixed Table, without Press or Carbon Holder, for deflagrating metals or exposing substances to frictional or voltaic electricity £0 18 6

2116B ,, another form, with Commutator 1 1 0

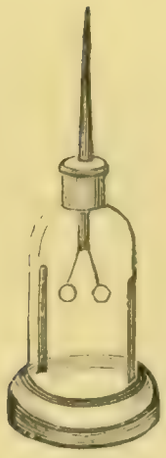
2116C **Discharging Hook,** Brass, length 24 inches 0 4 0



2116D



2117

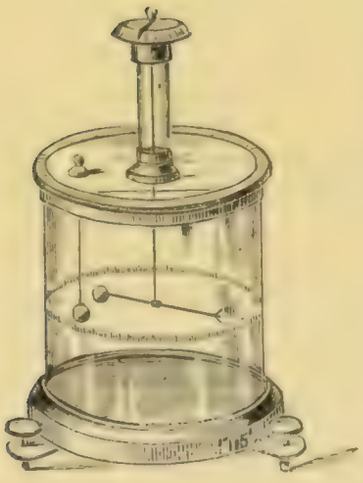


2118

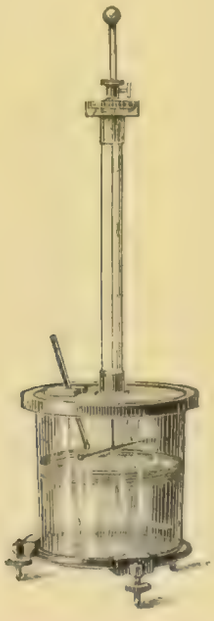
2116D **Spark Micrometer**, Reiss', with Silvered Millimetre Scale and Micrometer Screw, mounted on Brass Stand and Mahogany Base £2 5 0

2117 **Electrometer,** Pith Ball, Tate's 0 1 3

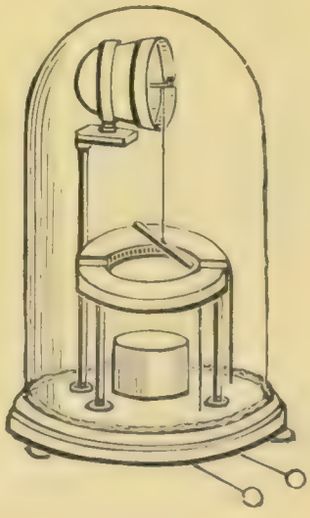
2118 ,, ,, ,, Cavallo's 0 12 0



2119



2119A



2120

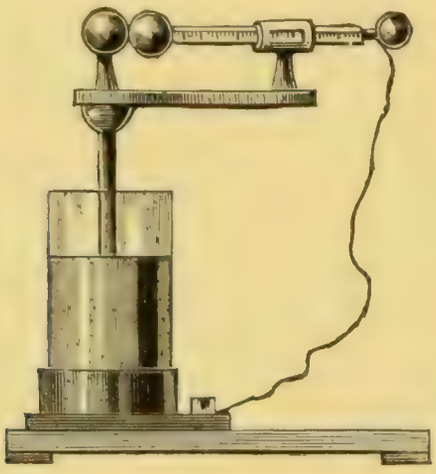
2119 **Electrometer,** Coulomb's Torsion Balance £3 15 0

2119A ,, Superior make, best finish 4 10 0

2120 , Thompson's 6 0 0



2123



2123A

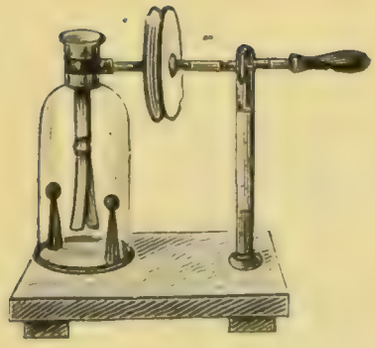


2124

2123 **Electrometer,** Lane's £0 5 6

2123A ,, with Adjustable Electrode, graduated into millimetres 0 15 0

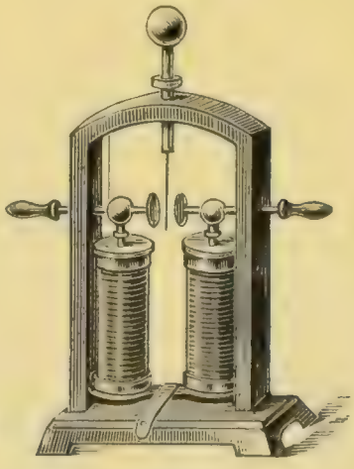
2124 ,, Gold Leaf ... capacity 1 pint 7/6, 2 pints 0 10 6



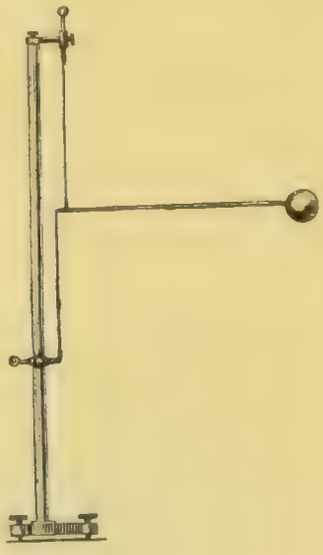
2125



2127



2128A



2128B

2125 **Electrometer,** Gold Leaf, with Sliding Condenser ... £0 15 0

2127 ,, Quadrant, Henley's, with Graduated Arc

Boxwood Scale 0 4 0

Ivory ,, 0 7 6

Transparent ,, 0 4 6

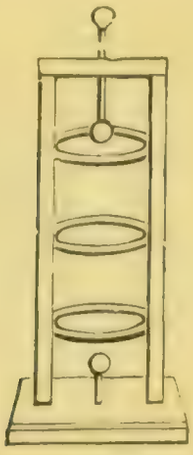
2128 ,, with Bohnenberger's Dry Pile 3 10 0

2128A ,, Bohnenberger's, another form 2 15 0

2128B **Electric Pendulum,** Weinhold's, Horizontal 1 5 0



2129



2131



2134

2129 **Electrophorus,** with Vulcanite Disc— 6 8 10 in. diam.

7/6 9/6 13/6 each

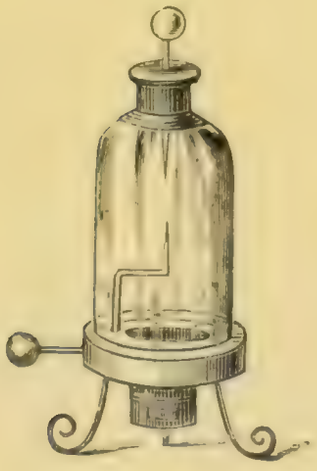
2130 ,, Resin, 10 in. Plate, Brass Cover, and Glass Handle £0 8 0

2131 **Egg Stand,** Mahogany 0 5 0

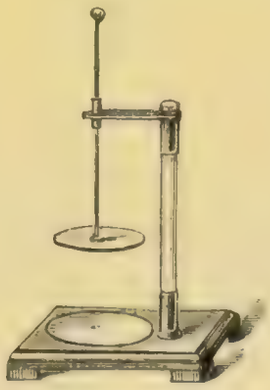
2133 ,, ,, with Reflector, best finish 0 15 0

2134 **Faraday's Butterfly Net,** with Glass Rod, on Stand ... 0 3 6

2134A ,, ,, ,, ,, ,, larger 0 4 6



2134B



2135



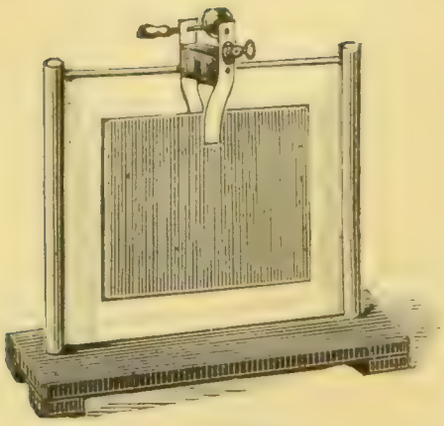
2136

2134B **Apparatus,** for Deposition of Smoke... ... ... £0 10 6

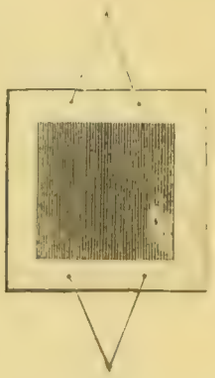
2135 **Figure Plate,** on Mahogany Stand, with Sliding Rod ... 0 6 0

2136 ,, ,, Brass 0 5 6

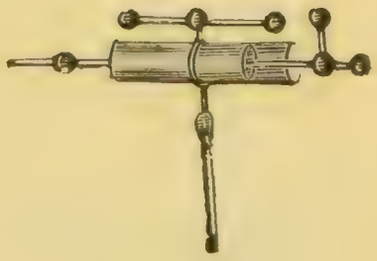
2136A ,, ,, ,, with Sliding Rod 0 7 6



2137



2138

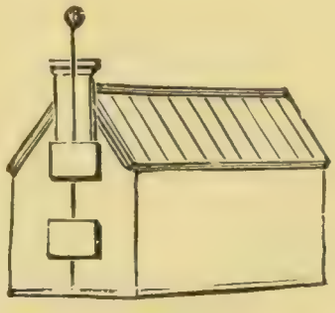


2139.

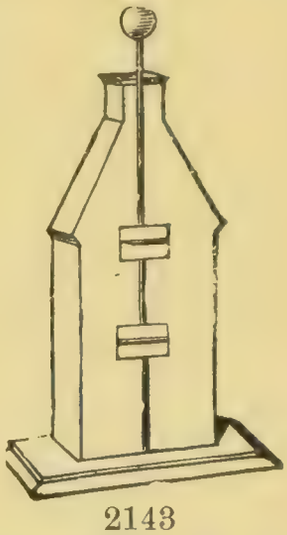
2137 **Fulminating Plate,** mounted on Mahogany Stand ... £0 16 0
2138 „ „ with Silk Handle 0 4 0
2139 **Harris' Unit Jar** 0 16 0



2140

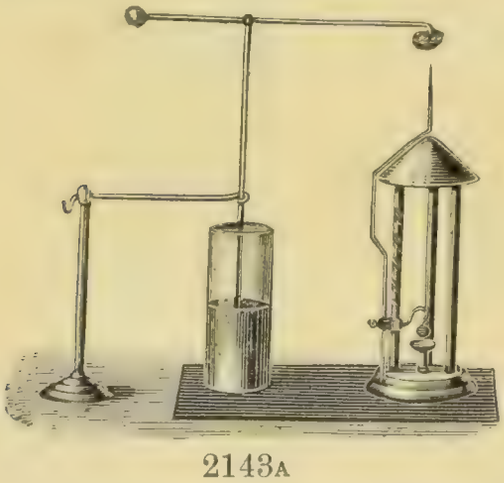


2141

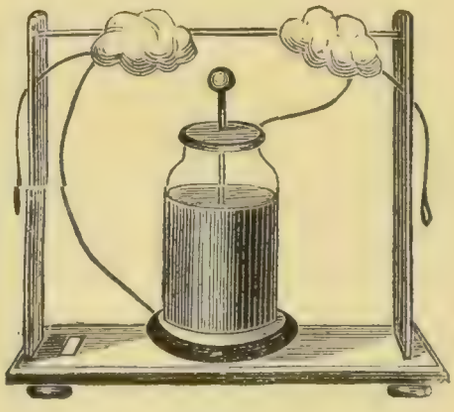


2143

2140 **Head of Hair** ... ... each 3/ and £0 5 0
2141 **House,** Fire 1 2 6
2142 „ Powder 1 4 0
2143 „ Thunder 0 6 0



2143A



2145

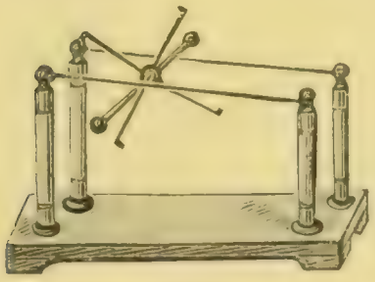


2145A

2143A **Apparatus,** for demonstrating the theory of Lightning Conductors £1 15 0
2145 „ for explaining the theory of the Thunder Cloud 1 5 0
2145A **Brass Ball,** with Point, on Insulated Rod, to show Lightning Discharge from Clouds 0 2 6



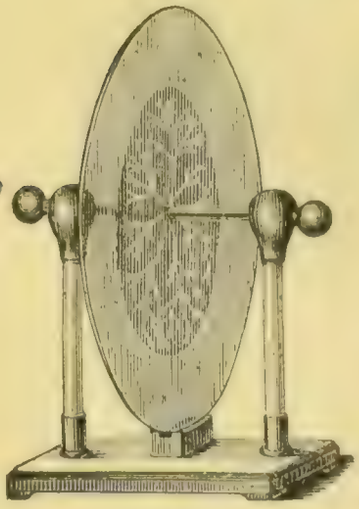
2146



2148



2148A



2148B



2148C

2146 **Apparatus,** for illustrating the effect of Electric Discharge on Mast of a Vessel £1 5 0

2148 **Inclined Plane** 0 16 0

2148A **Rotating Plate,** for showing attraction and repulsion ... 0 5 6

2148B „ „ Weinhold's Vertical, with 2 Revolving Plates, covered with Tinfoil 1 10 0

2148C **Glass Tube,** 3 ft. long, fitted with Brass Cap at each end, with Stopcock for exhausting, with Air Pump, to show Electric Discharge in vacuo 0 15 0



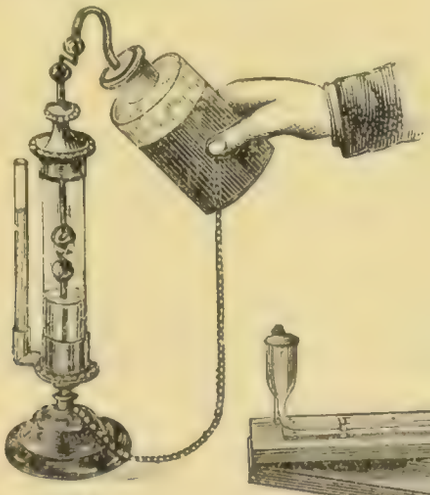
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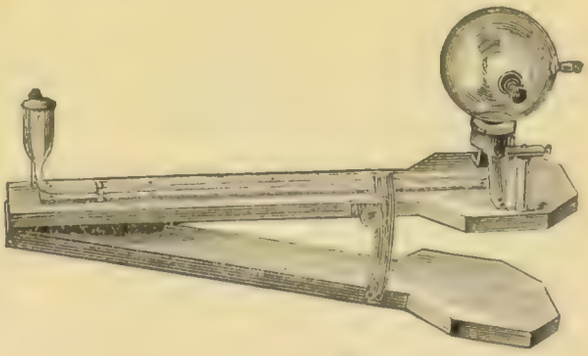
2151



2152



2153



2153A

2149 **Leyden Jar,** mounted, with Polished Top, covered with Tinfoil, Brass Rod, &c.—

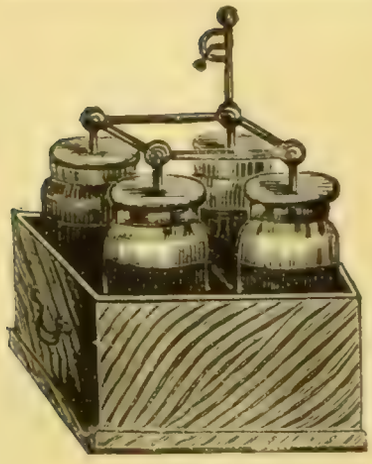
Capacity	½	1	1½	2	4 pints
	2/3	3/3	4/	5/	9/ each

2151 „ mounted, with Spider £0 8 6

2152 „ Varley's, coated with Platinum ... ½ pint 0 10 6

2153 **Kinnersley's Thermometer,** for showing atmospheric disturbance by Electric Spark (without Leyden Jar) ... 0 12 6

2153A **Reiss' Thermometer,** for ditto 2 8 0



2154

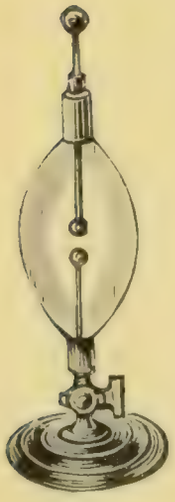


2156

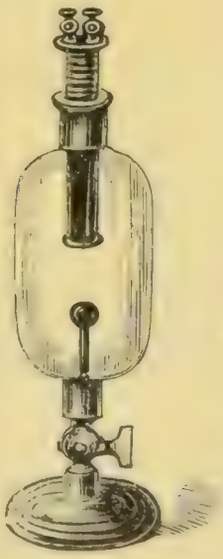


2157

2154	**Leyden Jar,** Battery of 4, capacity 2 pints, in Mahogany Tray							£1	5	0
2154A	,,	,,	4,	,,	1	,,	,,	,,	1	0	0
2155	,,	,,	6,	,,	2	,,	,,	,,	1	15	6
2156	,,	with moveable coatings				...	1 pint		0	6	0
							2 ,,		0	7	6
2157	**Jar,** Diamond		...	...		...	1 pint		0	6	6
							,,		0	8	6



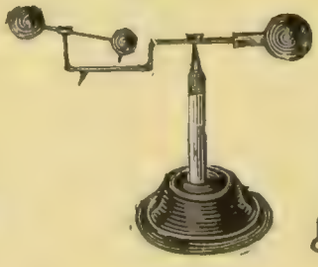
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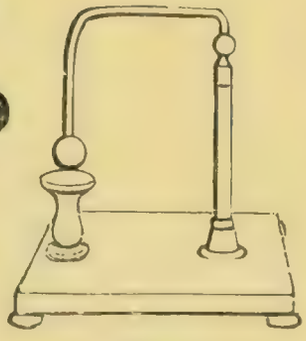
2159



2160



2162



2163



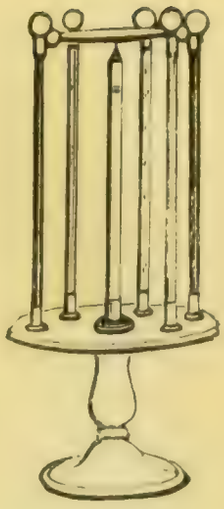
2164

2158	**Luminous Globe,** with Stopcock, Sliding Wire, and Forceps							£1	19	0
2158A	,,	,,	,,	smaller size		...	...	1	5	0
2159	,,	,,	to show the Rotation of Current round Magnet in vacuo			...	...	3	0	0
2160	**Magic Picture**		...	...		...	...	0	6	0
2161	**Mosaic,** Gold		...	...		...	per oz.	0	1	0
2162	**Orrery**	...	...	...		...	...	0	4	0
2164	**Pith Ball Stand,** with 12 Pith Balls					...	...	0	4	0
2165	,, **Balls**	...	...	...		...	per doz.	0	0	3
2166	,, **Figures**		...	...		...	each	0	0	8
2167	,, **Rods,** in Bundle, containing 1 doz.					...	...	0	0	6

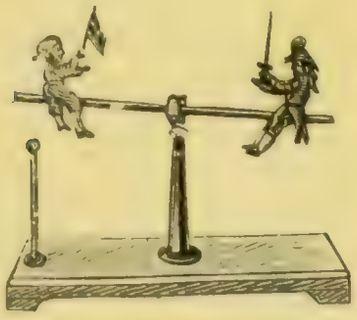

2168


2169


2171


2186


2172


2183


2184


2185

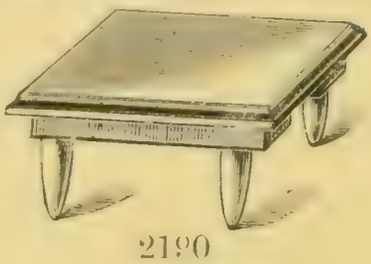
2168	**Cannon,** mounted on Mahogany Carriage ...	8/6 and	£0	12 6
2169	**Pistol**		0	4 6
2171	**Proof Plane,** Copper Disc, Ebonite Handle		0	1 0
2172	**Plume of Glass,** on Insulated Stand		0	4 6
2172A	,, smaller size		0	2 6
2175	**Rod, Glass,** for Pillars	per lb.	0	1 0
2176	,, ,, one half roughened, length 18 in. ...	each	0	1 9
2177	,, **Brass,** rounded ends, 3 ft. long	,,	0	2 0
2178	,, **Sealing Wax,** 10 × 1 in.	,,	0	1 6
2179	,, **Shellac,** 10 × 1 in.	,,	0	1 6
2180	,, **Sulphur,** mounted in Wood Handle ...	,,	0	2 6
2181	,, **Vulcanite,** Polished, 12 × ¾ in. ...	,,	0	1 6
	,, ,, 12 × 1 in. ...	,,	0	2 6
2182	,, half Brass and half Glass	,,	0	2 6
2183	**See Saw**	,,	0	12 0
2184	**Spiral Hand**	,,	0	2 6
2185	,, **Revolving,** on Stand	,,	0	10 6
2186	,, ,, Set of 5 Spirals, Best Coloured Glass Tubes, with Brass Caps, on Polished Mahogany Stand ...		1	12 6
2187	**Silk,** unspun	per skein	0	0 4



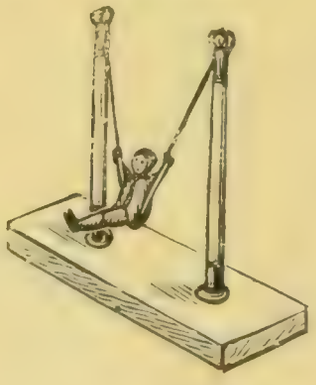
2188



2189

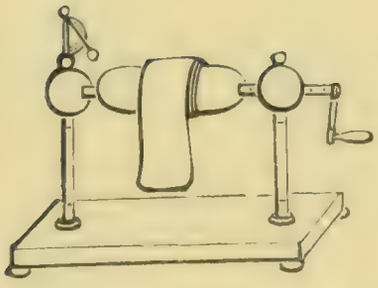


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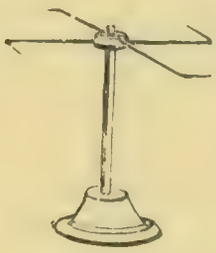


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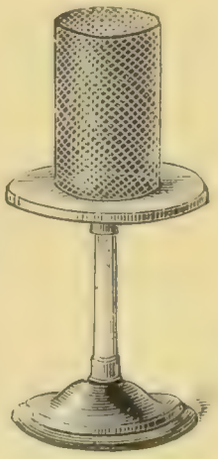
2188	**Sportsman,** on Mahogany Stand, with Leyden Jar ...	£0	18 6
2189	**Stand,** Insulating, Polished Mahogany, 7 in. diameter ...	0	5 0
2189A	,, with adjustable Sliding Rod	0	6 6
2190	**Stool,** Insulated, Blackwood, 12 in. × 11 in., with Glass Legs	0	6 6
	,, ,, Mahogany, 12 in. × 12 in.	0	11 6
2191	,, Glass Legs, set of 4	0	3 0
2192	**Swing,** with Glass Pillars, mounted on Polished Mahogany Base	0	12 0
2193	**Tinfoil** ... ...per lb. 1/6, best quality	0	2 6
2193A	**Roll of Tinfoil,** on Glass Rod	0	1 0



2194



2195



2196



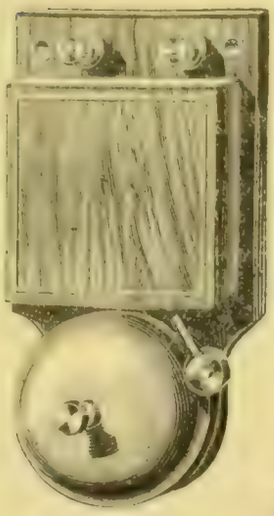
2202

2194	**Tinfoil Roller,** supported on Glass Pillars and Mahogany Base ... ... 12/6 and	£1	0 0
2195	**Whirl,** Brass, on Wood Stand	0	2 6
2196	**Wire Gauze Cylinder,** on Insulated Stand	0	6 0
2197	**Amalgam,** Electrical ... ... per oz.	0	0 6
2199	**Copper Leaf** (Dutch Metal) ... ... per book	0	0 2
2200	**Gold Leaf** ... ... ,,	0	2 0
2201	**Wood Caps and Handle for Cylinder,** the set ...	0	2 6
2202	**Words,** "Fire" or "Light," arranged on Glass with pieces of Tinfoil, in Mahogany Frame	0	6 6

GALVANIC APPARATUS.



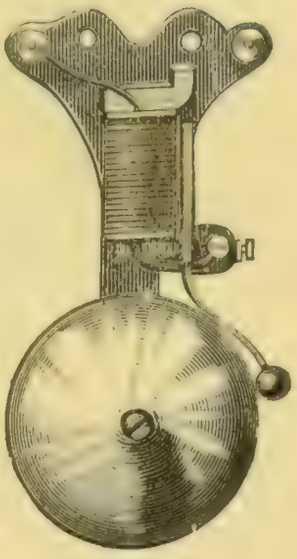
2203



2203A



2203B



2203D

2203 **Alarum or Electric House Bell,** English make, on Polished Mahogany Base, well finished, with Bell Metal Gongs, German Silver Springs, wound with Silk Covered Wire and Platinum Contacts—

Diameter of Gong	$2\frac{3}{4}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5 inches
	4/9	5/3	7/	8/6	11/	13/ each

2203A **Alarum or Electric House Bell,** English make, best quality and finish, on moulded Polished Teak Base, with Cast Bell Metal Gongs extra Nickel plated, wound with Silk Covered Wire, soaked in Paraffin for good insulation, Stout Platinum Contacts and specially tempered Steel Springs—

Diameter of Gong	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5 inches
	7/6	8/6	11/	14/	18/6 each

2203B **Circular Arc Bell,** mounted on Polished Wood Base, best finish—

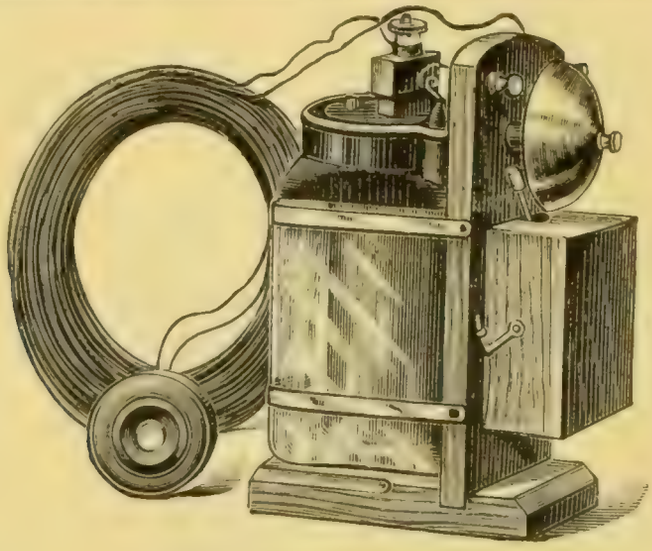
Diameter of Gong	3	$3\frac{1}{2}$	4 inches
	6/6	8/6	12/6 each

2203C **Alarum or Electric House Bell,** English make, with Nickelled Metal Gong, 3 in. diameter, on Wood Base, Platinum Contacts similar to No. 2203 ... ... £0 4 6

2203D **Alarum or Electric House Bell,** on Cast Iron Base, Nickelled Steel Gong, 3 in. diameter, 1 Bobbin ... 0 3 3



2204

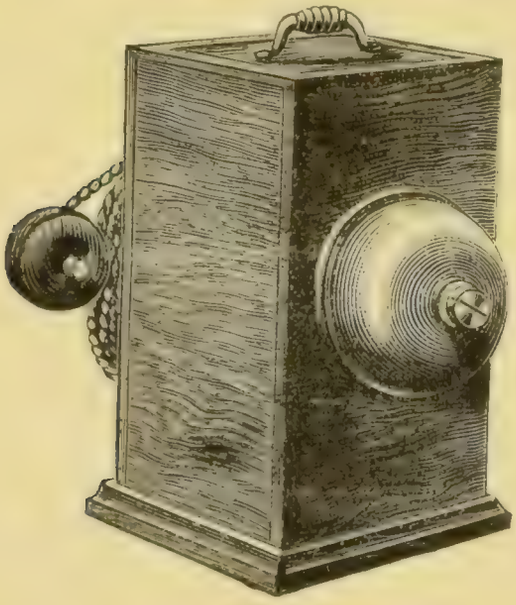


2204A

2204 **Bracket Electric Bell,** Dome Shape, turned outside and lacquered—

3½	4	4½	5 inches
7/6	9/6	12/6	13/6 each

2204A **Electric Bell,** Portable Set, complete, in Stained Wood Case, with 24 yards of Flexible Wire, and Push £0 12 6



2204B



2205

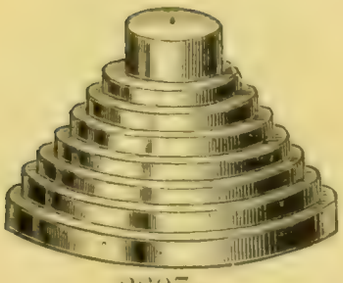
2204B **Electric Bell,** Portable Set, complete, containing a No. 2 Sealed Leclanche Battery, 3 in. Nickel Plated Bell, 12 yards Fancy Braided Twin Wire, with Polished Invalid Push, in Polished Ebonized Case £0 17 6

2205 **Bell Pushes,** for use with the Electric Bells, in Boxwood, Cocus, or Ebony—

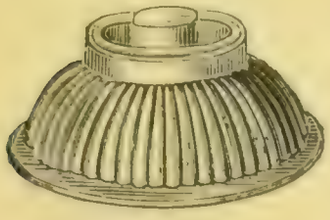
1¾	2½	3 in. diameter
6d.	8d.	1/ each
5/6	7/6	11/ per doz.

2207 **Bell Pushes,** in Ebony, Boxwood, Oak, Walnut, or Rosewood, with Ivory Buttons and Platinum Spring Contacts—

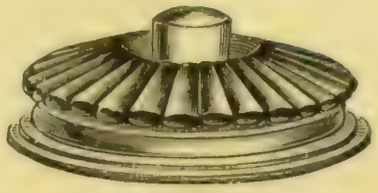
2	2½	3	3½	4 in. diameter
1/	1/2	1/4	1/6	2/ each



2207A



2208



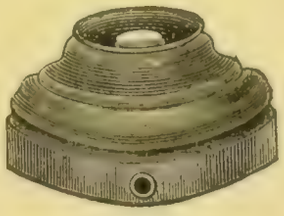
2208A



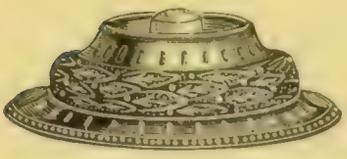
2207B



2208C



2209



2208B

2207A **Bell Pushes**, Bright Brass, Polished and Lacquered, Pyramid Pattern—

$1\frac{3}{4}$	$2\frac{1}{2}$ in. diameter
1/3	1/9 each

2207B ,, Brass, Turned and Lacquered, Ebonite Backs, and strong German Silver Springs (Crosby)—

2	$2\frac{1}{2}$	3	$3\frac{1}{2}$ in. diameter
1/8	2/	2/3	2/6 each

2208 ,, Brass, best quality, Vulcanite Backs, body made to unscrew in front, German Silver Springs, Curved Rib Pattern—

$2\frac{1}{2}$	3	$3\frac{1}{2}$ in. diameter
3/6	4/6	5/ each

2208A ,, Brass, best quality, Vulcanite Backs, German Silver Springs, body made to unscrew in front, Mushroom Pattern—

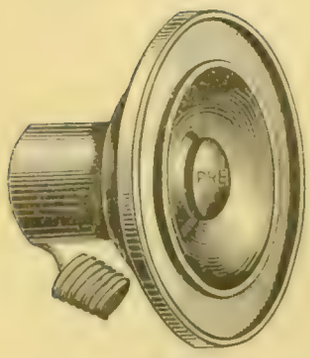
$2\frac{1}{2}$	3 in. diameter
3/6	4/ each

2208B ,, Brass, best quality, Vulcanite Backs, German Silver Springs, highly finished, Wreath Pattern, 3 in. diameter... £0 4 6

2208C ,, Bright Brass, Victoria Cross Pattern, $3\frac{1}{2}$ in. diameter 0 3 6

2209 **Wall Rosette**, to match Pear Shape Pushes, Boxwood, Cocus or Ebonized—

$2\frac{1}{2}$	3 in. diameter
10d.	1/3 each



2210



2210A



2211

2210 **Bell Pushes,** Brass Barrel, for Front or Side Door, Bright Brass, Lacquered—

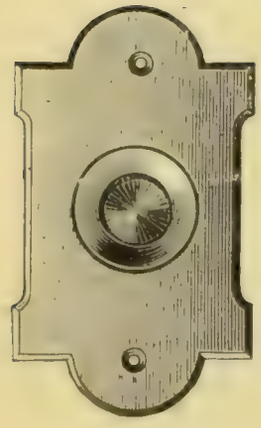
2½	3	3½	4 in. diameter
4/	4/6	5/	5/6 each

2210A ,, Brass, Short Barrel, Vulcanite Back, with word "Press" on Button—

2	2½	3	3½	4 in. diameter
1/6	1/10	2/6	3/	3/9 each

2211 ,, Brass, for Front Door, Bronzed, with Vulcanite Backs—

2½	3	3½	4 in. diameter
1/3	1/6	2/	2/6 each



2211A



2211B



2212

2211A **Bell Pushes,** Brass Barrel, Oblong, for Front Door, Polished and Lacquered—

1	1½	2	2½	3 in. diameter
2/9	3/6	4/6	6/	7/ each

2211B ,, Brass Oblong, without Barrel, Polished and Lacquered, Vulcanite Backs—

1½	2	2½ in. diameter
2/6	3/	3/9 each

2212 **Bell Pushes,** Invalid, Pear Shape, in Polished Cocus, Ebonized or Boxwood ... per doz. 10/, each £0 1 0

2212A ,, Brass, Pear Shape, Nickel Plated ... ,, 0 2 9

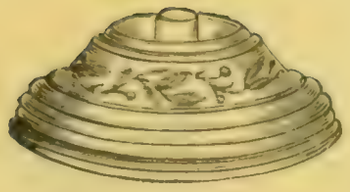
2212B ,, Turned Ivory, 2 in. diameter ... ,, 0 5 0

(Other sizes made to order.)

2215 **Bell Pulls,** Front Door, Round or Square, Plain, Bronzed, Visitors or Servants—

4	4½	5 in. diameter
6/6	7/6	9/6 each

2216 **Bell Push and Pull Combined,** Ivory Fittings ... 0 3 6



2217



2217



2218

2217 **Bell Pushes,** China, White or Black, with Gold Lines, each 9d., 1/ and £0 1 6

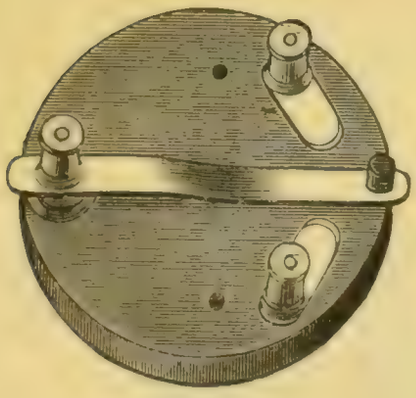
2218 **Indicator,** on Polished Teak or Walnut Wood Case, Glass Front with Gold Lettering, Ornamental Borders, Best Quality, with Lever Replacement Movement, Lettering to order—

2	3	4	6	8	12 calls
13/6	17/6	20/	32/	48/	60/ each

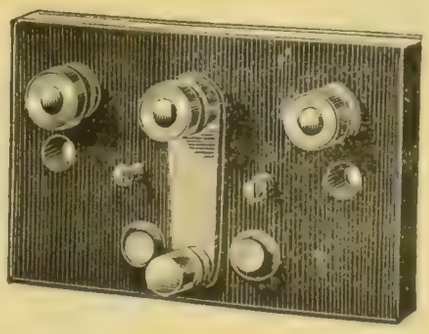
2218A **Electrical Indicator,** Movements English make—

Ordinary Quality, each 0 2 0

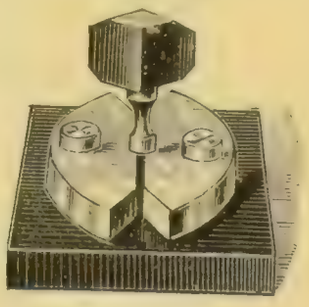
Best ,, ,, 0 2 6



2221



2221A



2221B

2221 **Switch Round,** to change the direction of the current, &c.

1	2	3 way
1/6	2/	2/6 each

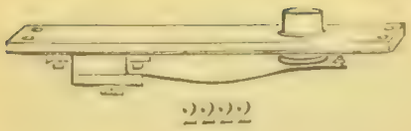
2221A **Switch Square,** to change the direction of the current, on Ebonite Base, Best Quality—

1	2	3	4 way
2/	2/6	3/6	4/6 each

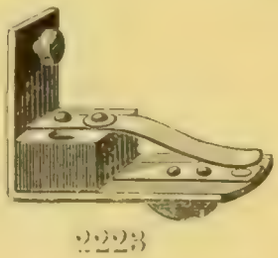
2221B **Plug Switches,** on Teak Bases—

1	2	3 way
2/9	3/6	4/6 each

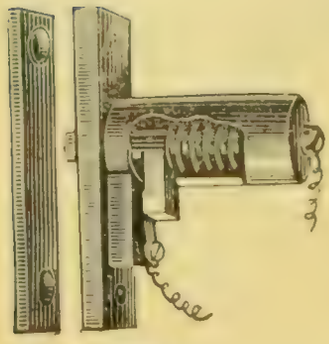
2221C **Staples,** Coppered, for Electric Bells ... per gross £0 1 0



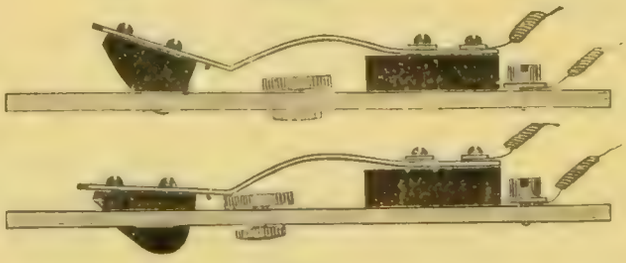
2222



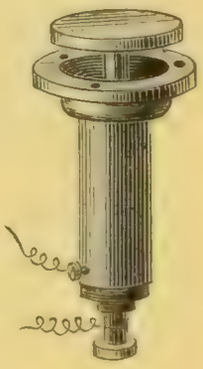
2223



2224



2223A



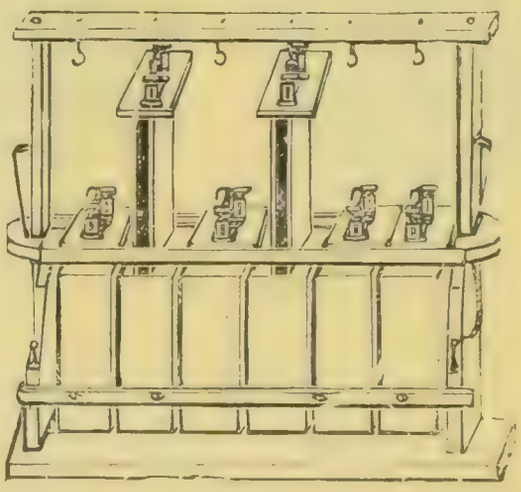
2227

2222 **Thief Detector,** for Doors or Windows, Brass, with German Silver Spring, small size £0 1 4
Larger, with Platinum Contact ... 0 1 9
2223 „ „ 2 ways, to ring on opening or shutting door (Door Trigger) 0 2 0
2223A „ „ Patent Automatic 0 2 6
2224 **Burglar Alarm,** Brass Barrel and Counter Door Plate ... 0 3 0
2225 „ „ Water-tight, Ivory Insulation 0 3 9
2227 „ „ Floor Contact, Brass, with Removeable Plug for fixing under Carpet 0 3 0
2228B **Ebonite Sheet** ... ... per lb. 0 5 0
2228C **Guttapercha Tissue** ... ... per square yard 0 0 10

BATTERIES.



2229



2231

2229 **Battery, Bichromate,** Bottle Shape, with Ebonite Top and Brass Fittings—

Capacity	¼	½	1	2 litres
	2/9	3/6	5/	7/6

2229A **Carbons,** with Bevelled Edges and Coppered Ends, for above Batteries—

¼	½	1	2 litre size
6d.	8d.	10d.	1/1 each

2229B **Spare Bottles,** for ditto, fitted with Brass Collars—

¼	½	1	2 litres
9d.	1/	1/6	2

2229C **Spare Zincs,** with Hole Drilled and Tapped—

¼	½	1	2 litre size
4d.	5d.	6d.	8d. each

2229D **Chromic Salt,** in Bottles, for charging above Batteries—

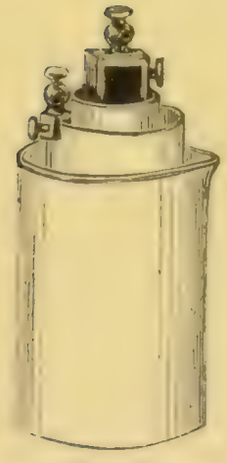
¼	½	1	2 litre size
4d.	6d.	9d.	1/3 per bottle

2230 **Battery, Bichromate,** Bottle Shape, 2 litres, with 2 Zincs and 3 Carbons £0 12 6

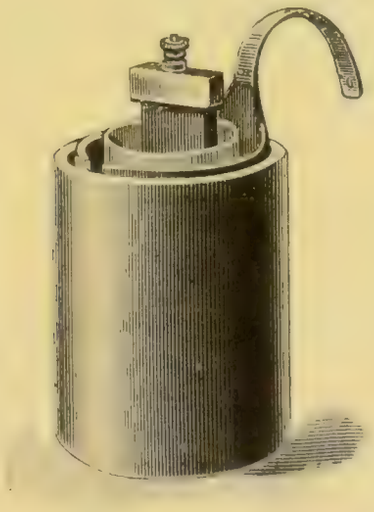
2231 **Battery, Bichromate,** Set of 6 Glass Cells in Mahogany Frame, with arrangement for suspending one or all the Zincs and Carbons when not required for use. It is sufficiently powerful to heat Platinum Wire, show the Electric Light and decompose Water. Ebonite Covers, with Brass Screws, Hooks and Connections, complete ... 1 15 0

2231A **Battery, Bichromate,** Set of 6, 1 litre size, as above, in Oak Frame 3 12 6

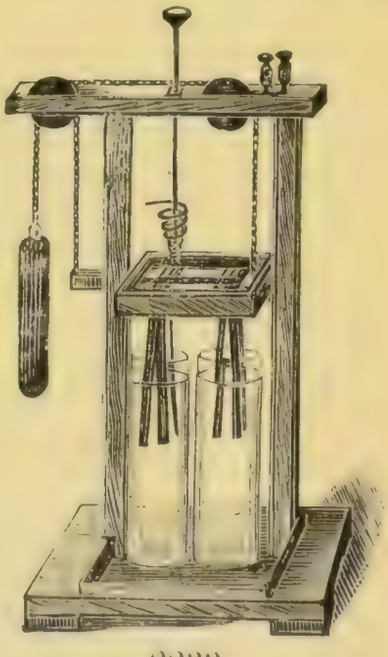
2231B **Glass Battery Cells,** only, for above each 8d. and 0 1 9



2232



2232A



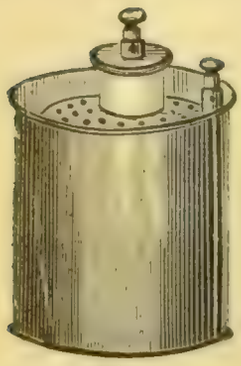
2233

2232 **Battery,** Bunsen's, Outer Cell Brown Stoneware—
Capacity 1¼ pint. Size of Carbon 7 × 1 × 1 in. £0 3 8
,, 2 ,, ,, 8 × 1 × 1¼ in. 0 5 0

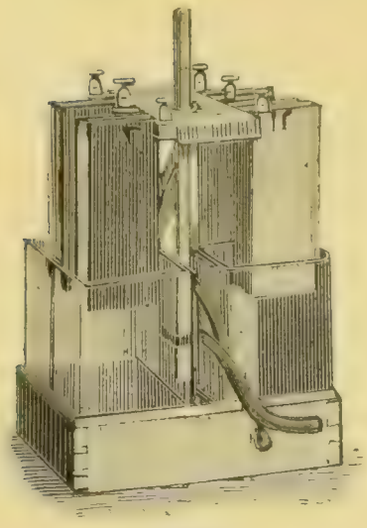
2232A ,, Bunsen's, cheaper form—

Capacity 1	2	3 pints
3/	4/	5/6 each

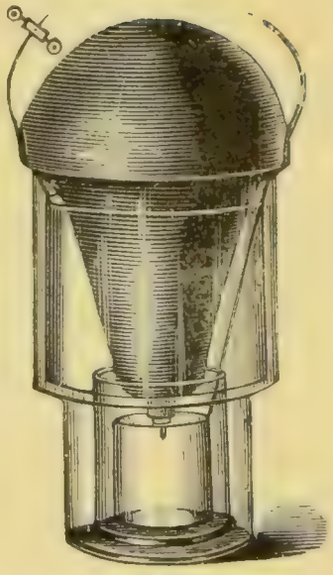
2233 ,, Bunsen's Bichromate, on Oak Stand, with Pulleys and Weights complete, 4 Glass Cells 14 × 4 in., Carbon Plates 9½ × 2 × ½ in. 3 10 0



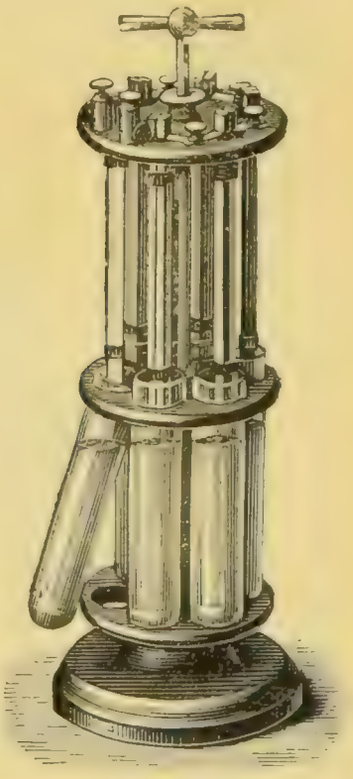
2234



2233A



2233D



2233F

2233A **Battery,** Bunsen's Bichromate, Plates 7 × 3 in., Strong Oak Tray, with arrangement for lifting elements out of liquid—

Sets of	2	4	6	8	elements
	£2 2/	£3	£3 10/	£4 15/	each

2233C **Dry Battery,** E C C Pattern, for Electric Bells and Telephones, very powerful—

No.	1	2	3	
	8 × 3¼	7 × 2½	5¾ × 2	in.
	4/	3/3	2/6	each

2233D **Meidinger Battery** ... ... small 3/6, large £0 4 6

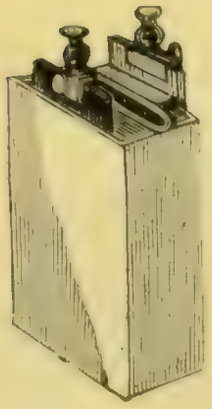
2233F **Portable Battery,** Bichromate, with 6 Elements, fitted on upright Rod for raising and lowering, will light a 6 to 8 volt Incandescent Lamp, 3 to 4 candle power, complete 0 17 6

2234 **Battery,** Daniell's, size of Outer Copper Cell 4¾ × 4½ in. ... 0 4 6

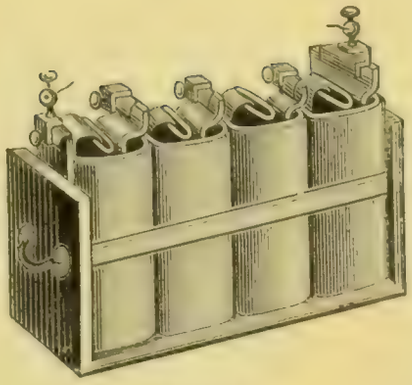
,, ,, ,, ,, 9½ × 4½ in. ... 0 6 0

2234A **Dry Batteries,** Hellesen's, for Bells, Telephones, &c.—

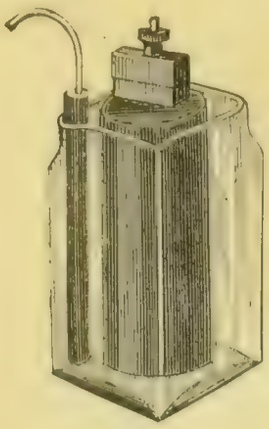
No.	1	2	3	4	6	
	7×4×4	6½×3×3	5½×2½×2½	5½×2¼×2¼	3¾×1½×1½	in.
	4/	2/6	2/	2/	1/6	each



2235



2236



2239



2240

2235 **Battery,** Grove's, in Glass or White Stoneware Cell, Platinum Plate $5\frac{1}{2} \times 2$ in., Outer Cell $4\frac{3}{4} \times 3\frac{1}{4} \times 1\frac{3}{4}$ in. ... £0 8 6

2236 ,, Grove's, Set of 4, in Mahogany Tray 1 15 0

2237 ,, ,, Set of 6 ,, ,, ... 2 7 6

2238 ,, ,, Stoneware, Outer Cell $6\frac{1}{4} \times 5 \times 2\frac{1}{4}$ in., Platinum Plate $7 \times 3\frac{1}{2}$ in., Porous Cell $5\frac{3}{4} \times 5 \times 1$ in., best Zinc 7×3 in., complete 0 12 0

2239 **Battery,** Leclanche's Patent Constant, ordinary form, with Porous Pot, for Electric Bells, &c., retain the full working power for about eighteen months, and require no further attention after being charged than the occasional addition of a little water; complete, with charging—

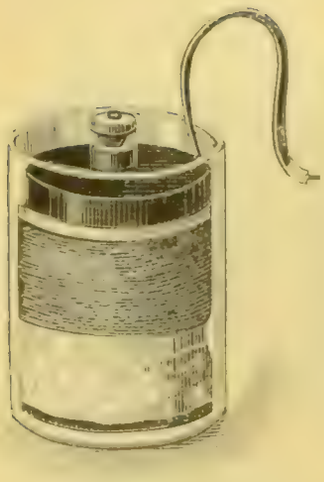
1	2	3 pints
1/6	1/9	2/9 each

2240 **Battery,** Leclanche's Patent, agglomerate form, used for Electric Bells, Railway Signals, Firing Purposes, &c.; will perform three or four times as much work as the old Porous Pot form—

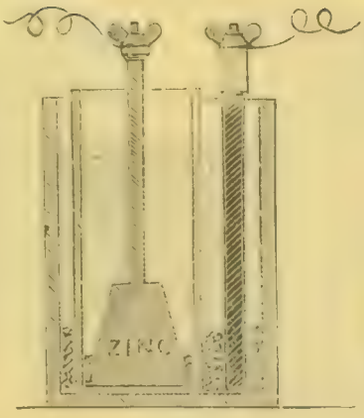
1	2	3 pints
2/6	3/	3/6 each

2240A **Separate Fittings for the Leclanche Batteries—**

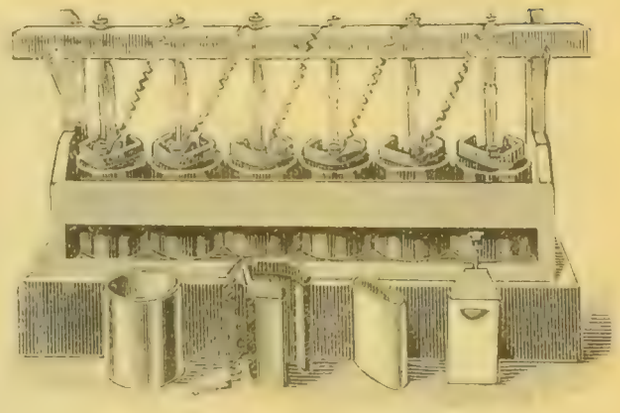
	1 pint	2 pints	3 pints size
Porous Pots, charged	1/	1/3	1/6 each
Carbon Plates	5d.	7d.	8d. ,,
Agglomerate Plates	1/1	1/4	1/6 per pair
Rubber Rings	3d	4d.	5d. ,,
Zincs	3d.	4d.	5d. each
Chargings	4d.	4d.	6d. ,,
Glass Jars	4d.	5d.	7d ,,
Porous Tube to hold the Zinc	3d.	4d	5d ,,



2240B



2240D



2240E

2240B **Sulphate of Copper Battery,** Menotti's, Ebonite Cell—

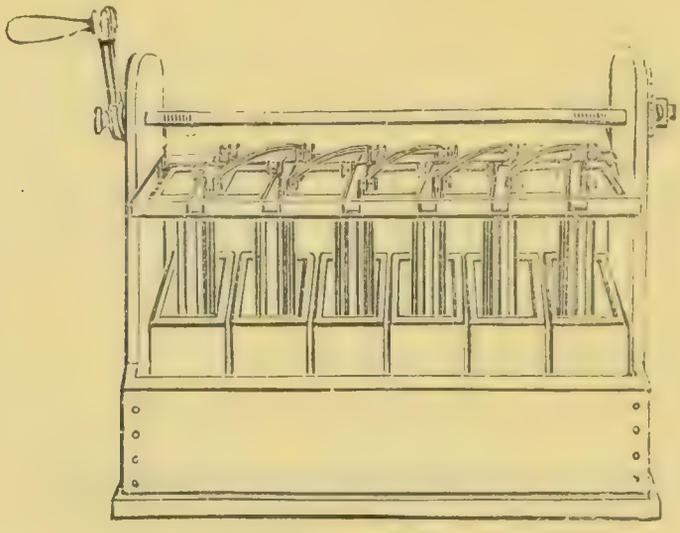
		Capacity 1½ pint	£0	4 0
2240C	„ „ „	in Glass Cell	0	3 0
2240D	**Patent Mercury Bichromate Battery,** Fuller's	...	0	5 6

2240E **Primary Battery,** for charging Accumulators, with arrangement for raising and lowering the Zinc Plates, capacity of Outer Cells 3 pints—

Set of 3	6	10
£1/10/	£2/10/	£3/10/ per set



2241



2243

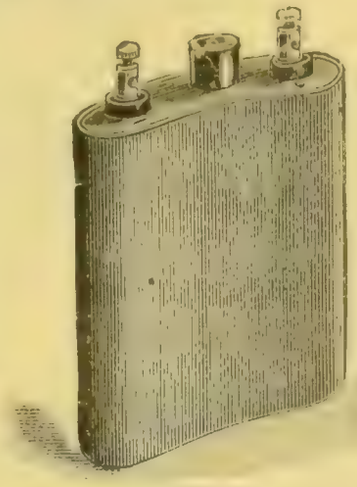
2241 **Smee's Batteries,** in Glass or White Stoneware Cell—

	Size of Cell 5¼ × 4 × 1⅞ in.	£0	5 9
2242	**Smee's Batteries,** Set of 6, in Mahogany Tray, as Fig. 2236	1	14 0
2243	**Smee's Batteries,** Set of 6, in Mahogany Frame, with Rack-work arrangement	2	10 0

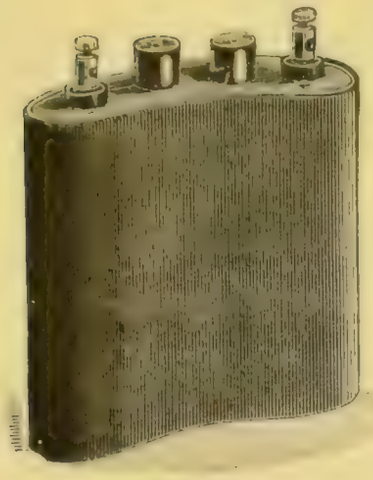
POCKET ACCUMULATORS.



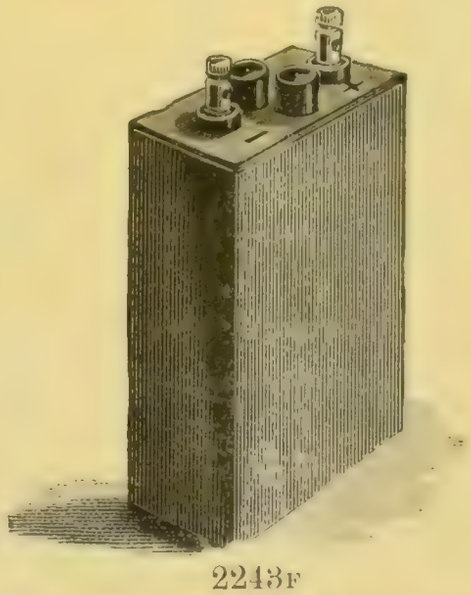
2243A



2243B



2243D



2243F

2243A **Accumulator Lithenode Elements,** in Glass Cell $4\frac{3}{4} \times 3 \times 1\frac{3}{4}$ in. £0 9 6

	Volts.	Capacity, amp. hours.	Hours burning a ½-ampère Lamp.	Weight.	Dimensions.	Price.
2243B	2	2	4 (2 cells	12 oz.	$2\frac{7}{8} \times 1 \times 4$ in.	£0 11 6
2243C	2	3	6)	15 ,,	$3\frac{3}{4} \times 1 \times 4$,,	0 12 6
2243D	4	$1\frac{1}{2}$	3	16 ,,	$3\frac{3}{4} \times 1 \times 4$,,	0 16 0
2243E	4	3	6	23 ,,	$2\frac{7}{8} \times 1\frac{1}{2} \times 4\frac{1}{2}$,,	0 18 6
2243F	4	4	8	40 ,,	$3\frac{3}{8} \times 2\frac{1}{2} \times 5\frac{1}{2}$,,	1 7 6

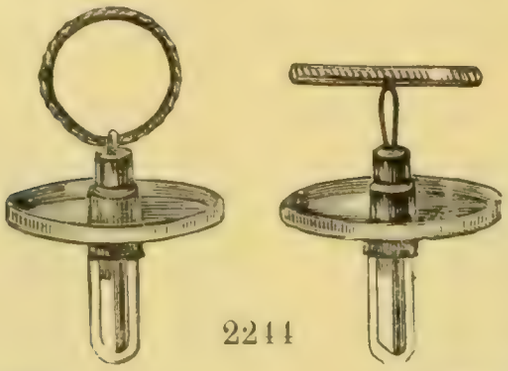
The Capacity is approximate, and is taken from a series of discharges on an Edison-Swan ½-ampère Fairy Lamp.

Sizes 2243B and 2243D, being curved, are easily carried in the pocket, and are adapted for all purposes where a compact and light Battery is required, as in testing works for Telegraphs and Telephones, working small Motors, and Coils. Two of either of these sizes will also light a Fairy Lamp for a considerable time.

Sizes 2243D (curved) and 2243F (rectangular) are most suitable for Electric Jewellery, small Reading Lamps, Electric Fairy Lamps for Stage use, and small Surgical Lamps for Surgeons' and Dentists' use.

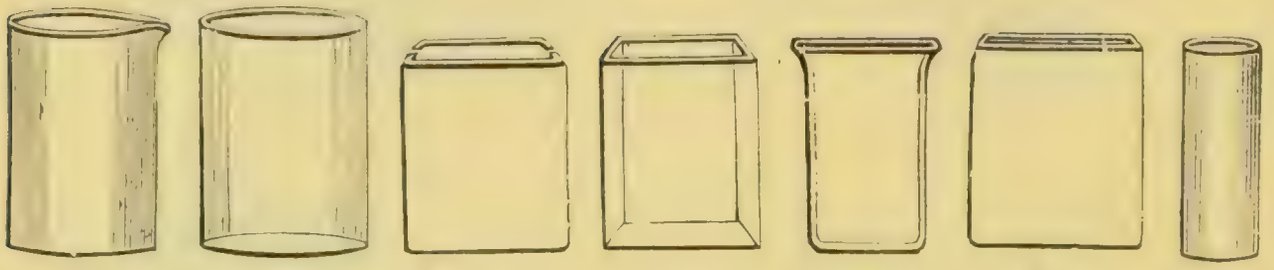
Size 2243F is largely used for Stage purposes, being suitable in cases where more power is required than is obtained from the smaller sizes, and will light two or three Fairy Lamps at a time for intermittent periods of half an hour to an hour.

2243G **Body Belt,** Leather, for carrying 3 to 5 Curved Cells ... £0 7 6



2244

2244 **Batteries, Floating** ... ... per pair 6/6, each £0 3 9



2245 2246 2247 2248 2249 2250 2251

2245 **Battery Cells,** Bunsen's, White Stoneware, Glazed, with Lip—
$5\frac{1}{2} \times 4$ in. £0 0 8
,, ,, ,, ,, ,, larger size, $6\frac{1}{4} \times 5$ in. 0 1 0

2246 ,, ,, ,, Glass, Stout ... $6\frac{1}{2} \times 4\frac{3}{4}$ in. 0 1 0

Height	5	6	$6\frac{1}{2}$	8	8	$9\frac{1}{2}$	10 in.
Diam.	4	4	$4\frac{3}{4}$	4	5	$6\frac{1}{4}$	$8\frac{1}{4}$ in.
	6d.	7d.	8d.	10d.	1/	1/9	3/6 each

2247 **Battery Cells,** Grove's, White Stoneware (Fig. 2247), or Glass (Fig. 2248) 0 1 0

2248 ,, ,, Smee's, White Stoneware, as Fig. 2247 or 2248 0 1 0

2249 ,, ,, Grove's, Flat, Porous, with Lip—
Height $4\frac{1}{2}$ in., width at top $3\frac{1}{2}$ in., width at bottom $2\frac{1}{2}$ in. 0 0 5
,, 5 ,, ,, $4\frac{1}{2}$,, ,, $3\frac{1}{2}$,, 0 0 6
,, $5\frac{3}{4}$,, ,, 5 ,, ,, 4 ,, 0 0 9

2250 **Battery Cells,** Flat, Porous—$6\frac{3}{8} \times 4\frac{1}{2} \times 1$ in. 0 0 10

2251 ,, ,, Round, Porous—

2	3	3	4	5	6	6	7	8	9	10 in. diam.
1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$ in. long
2d.	2d.	2d.	3d.	3d.	4d.	4d.	5d.	6d.	7d.	9d. each

(*Other Sizes made to order.*)

2252 **Platinized Silver Sheet,** for Smee's Batteries ... per oz. £0 9 0

2253 **Platinum Sheet,** for Grove's Batteries (varies) per oz., about 2 10 0

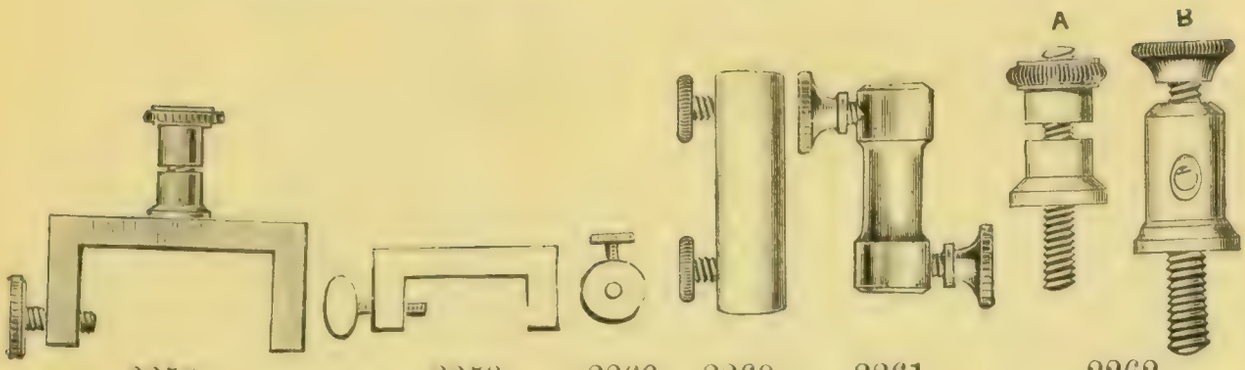
2254 **Carbon Blocks,** for Bunsen's Batteries, cut from Gas Carbon—
$7 \times 1 \times 1$ in., 7d. $8 \times 1 \times 1\frac{1}{4}$ in., 1/. $9 \times 1\frac{1}{2} \times 1\frac{1}{2}$ in., 1/6 each.

2255 **Carbon Plates,** for Bichromate Batteries, &c., cut from Gas Carbon—
$4 \times 1\frac{3}{4} \times \frac{3}{8}$ in., 5d. $6 \times 1\frac{1}{4} \times \frac{3}{8}$ in., 6d. $6 \times 2 \times \frac{3}{8}$ in., 8d. $6 \times 3 \times \frac{3}{8}$ in., 10d. each
Carbon Blocks or Plates, any size, made to order.

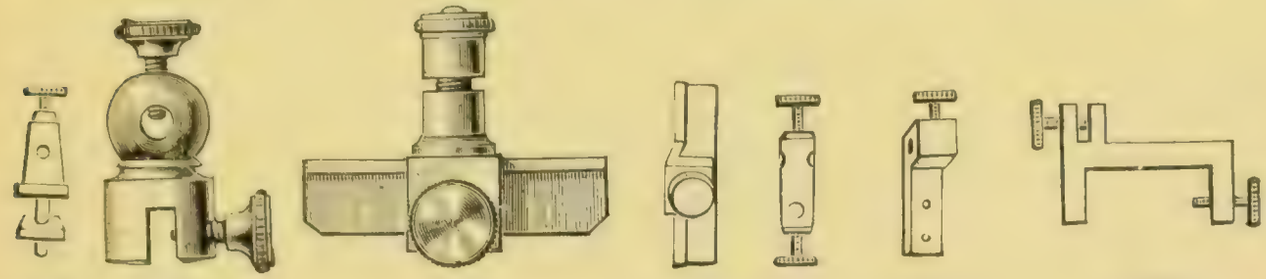
2256 **Carbon Pencils,** $12 \times \frac{1}{4} \times \frac{1}{4}$ in. ... ... each £0 1 0

2257 ,, **Points,** for Electric Light, $3 \times \frac{5}{16}$ in. ... per pair 0 0 6

SCREWS FOR BATTERIES.



2258 2259 2260 2260A 2261 2262

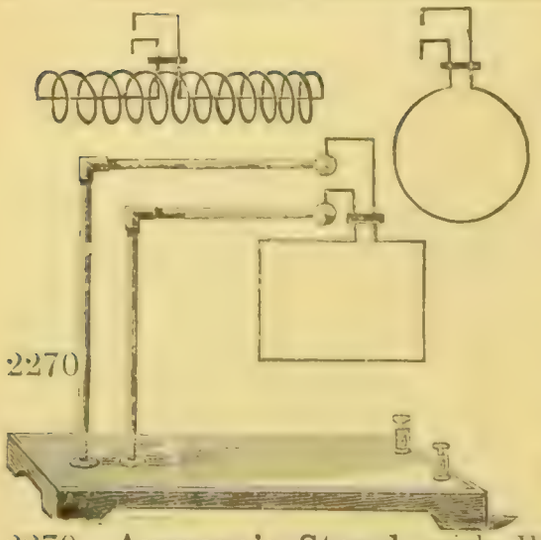


2263 2264 2265 2266 2267 2268 2269

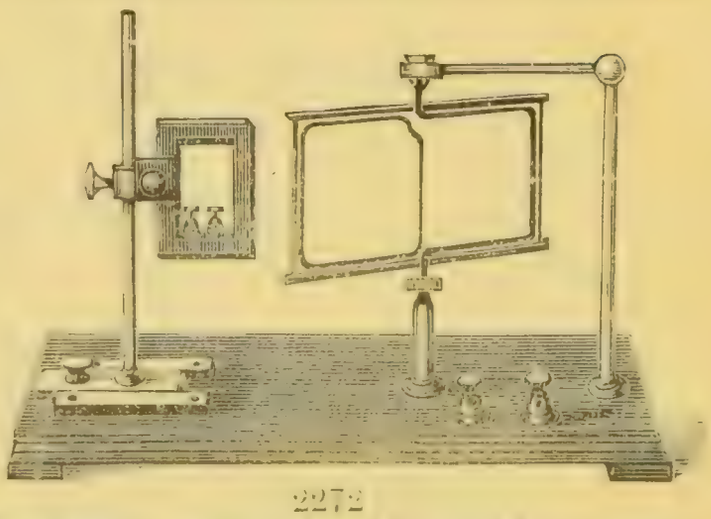
2258	**Clamps,** Bunsen's, double, bronzed ...	each 7d., per doz.	£0	6	6
2259	,, ,, single ,, ...	each 6d. and 7d., per doz. 5/ and	0	6	6
2260	**Connector,** Single	each 6d., per doz.	0	5	0
2260A	,, Double ...	...per doz. 2/, 2/6, 3/ and	0	3	6
2261	,, ,, ...	each 5d., per doz.	0	4	6
2262	**Daniell's,** Single—				

A No.	1	2	3	4	5
	1/6	2/	2/6	3/6	4/6 per doz.
B No.	9	8	7	6	
	1/6	2/	3/6	5/ per doz.	

2263	**Daniell's,** Single, with Nut, small ...	each 3d., per doz.	0	2	6
	,, ,, ,, larger ...	,, 4d. ,,	0	3	6
2264	,, Double	,, 5d. ,,	0	4	6
2265	**Grove's,** Terminal, bronzed ...	,, 7d. ,,	0	6	0
2266	,, Single, bronzed... ...	,, 6d. ,,	0	5	0
2267	**Connector,** Double, small ...	,, 3d. ,,	0	2	6
	,, ,, medium ...	,, 4d ,,	0	3	6
	,, ,, larger ...	,, 5d. ,,	0	4	6
2268	**Smee's,** Single, bronzed	,, 6d. ,,	0	5	0
2269	,, Double ,, ...	,, 7d. ,,	0	6	6



2270

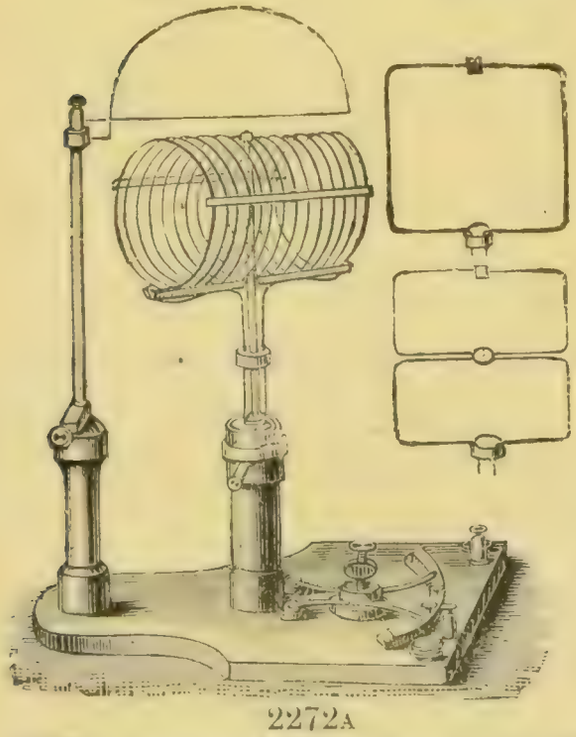


2272

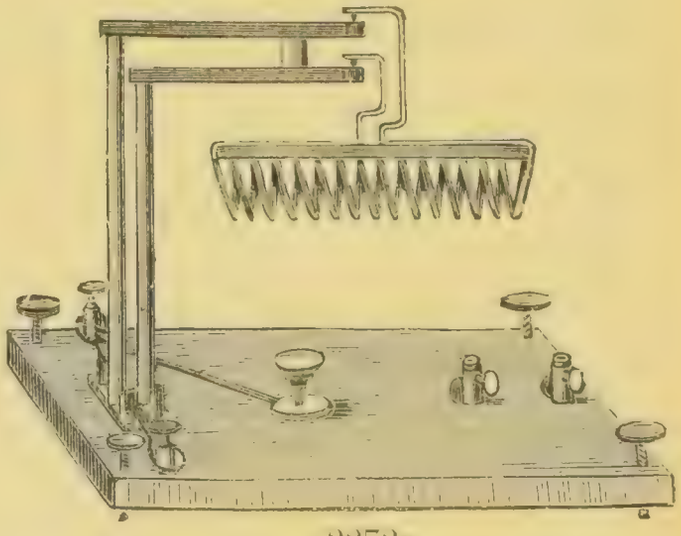
2270 **Ampere's Stand,** with Wires to show attraction of parallel currents, with Solinoid Rectangle, and Ring £1 5 0

2271 ,, ,, with Reverser 1 10 0

2272 ,, ,, with Set of 3 Bent Wires on Moveable Circuit, and mutual action of currents flowing in different directions ... 2 10 0



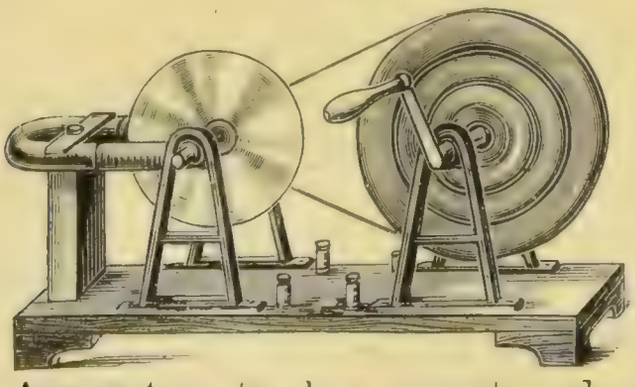
2272A



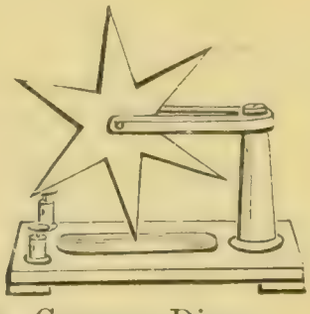
2272B

2272A **Ampere's Stand,** with Set of 5 Bent Wires and Levelling Screws £2 12 6

2272B ,, ,, another form 2 12 6



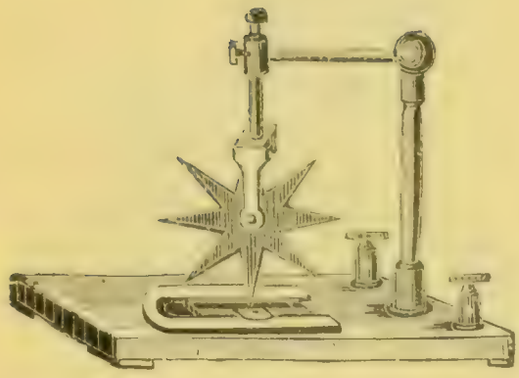
2273



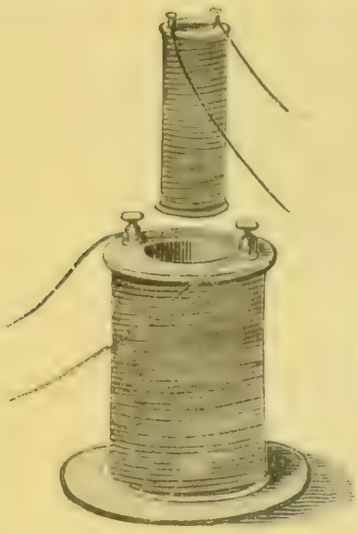
2274

2273 **Apparatus,** to show current produced in a Copper Disc rotating between Poles of Magnet £2 0 0

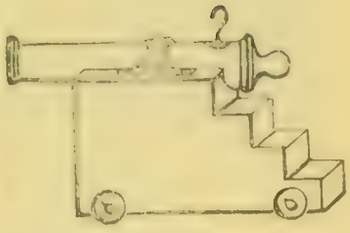
2274 **Barlow's Stellar Wheel** 0 10 0



2274A



2277A



2278

2274A **Barlow's Stellar Wheel,** larger, superior make, with Fixed Magnet £1 7 0

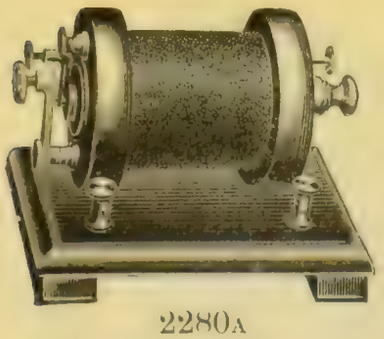
2276 **Bars of Antimony, Bismuth, and Nickel** 0 4 3

2277 **Bobbin of Wire,** to show Induction 0 5 0

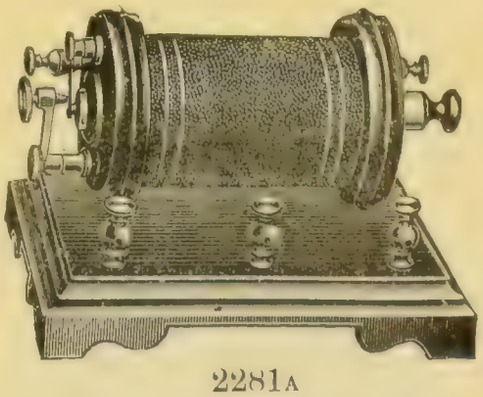
2277A ,, ,, ,, ,, mounted on Stand ... 1 1 0

2278 **Cannon,** mounted on Mahogany Stand 0 10 6

2279 **Chain,** alternate Links Platinum and Silver ... 3 ft. long 0 5 6
6 ft. ,, 0 9 0



2280A



2281A

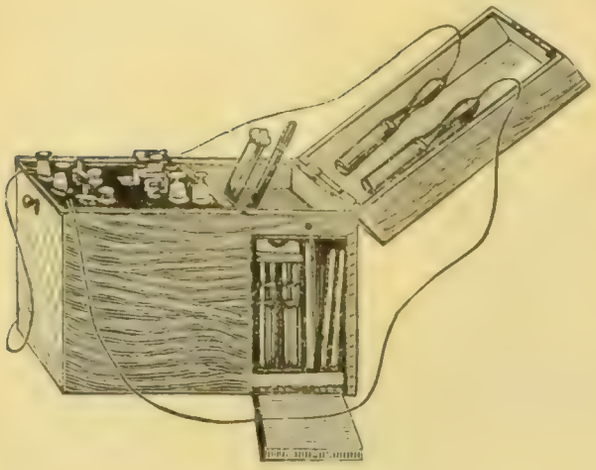
2280A **Medical Coils,** with Regulators, for increasing strength of Current -

No.	1	2	3
	13/	17/	21/ each

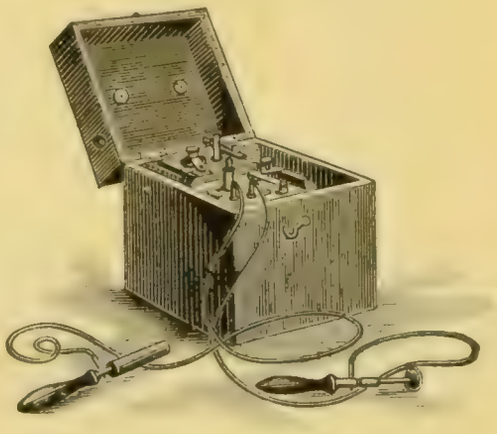
2281A **Medical Coils,** with Primary and Secondary Currents—

No.	4	5
	25/	31/ each

2282A **Brass Handles,** for above Coils, with Cords ... Brass, per pair £0 1 6
Nickel Plated ,, 0 2 0



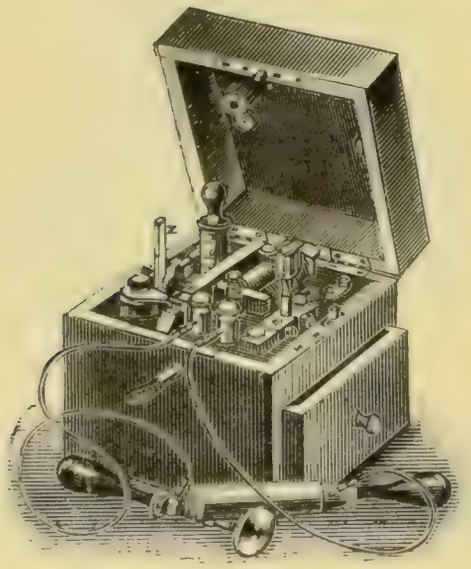
2287



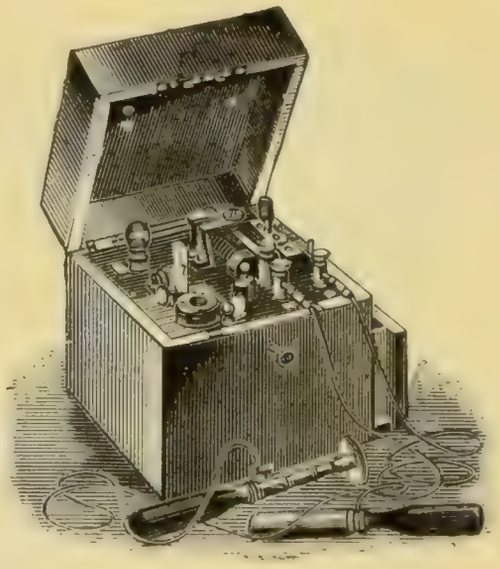
2287A

2287 **Medical Coil Machine,** as supplied to the Indian Government for the use of Medical Officers, with simple and effective lever arrangements for regulating the shock, Bichromate Battery, and extra Zinc Plates, Sponge Directors, Flexible Cord and Handles, complete, in Polished Mahogany Case, convenient for Medical Practice £3 15 0

2287A **Medical Coil,** complete, in Wood Case, small size ... 1 5 0



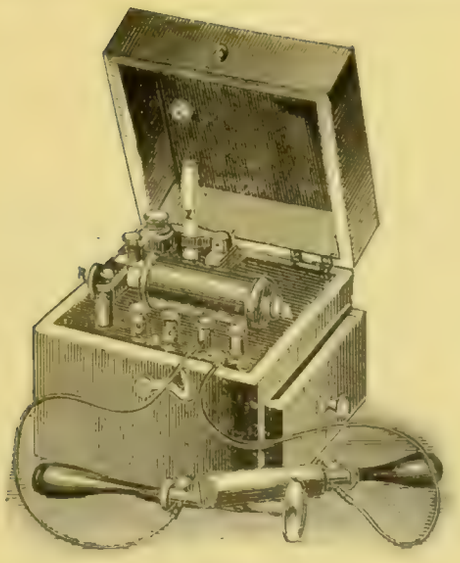
2287B



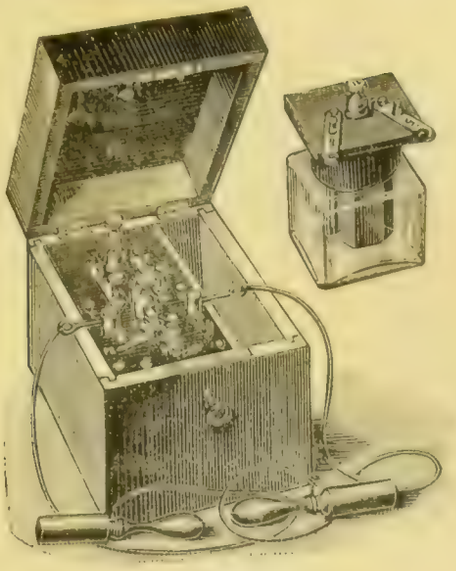
2287C

2287B **Medical Coil,** Larger, with Plug Switch, in Polished Walnut Case £1 17 6

2287C ,, ,, with Nickel Plated Fittings 2 0 0



2287D



2287E

2287D **The Byng Coil,** in Polished Walnut Case £1 7 6

2287E ,, ,, ,, with Regulating Switch 2 2 0



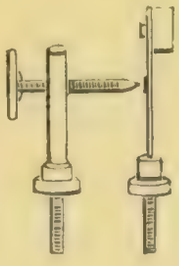
2289



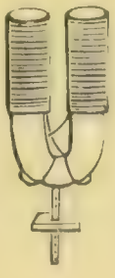
2290



2291



2293



2294



2295

2289 **Brass Handles,** with Wire attached, for Shocks ... per pair £0 1 6

.. ,, ,, ,, ,, Nickel Plated .. 0 2 0

2290 **Brass Disc,** on Insulated Handle, to direct the current on a particular nerve 0 3 6

2291 **Sponge Directors** 0 3 6

2292 **Flexible Brass Cord,** for Coils and Telephones, insulated with pure India Rubber and Braided Silk—

2 Strand ... ... per yard 0 0 4

3 ,, ... ,, 0 0 5

2 ,, Telephone Cord, Mohair ,, 0 0 5

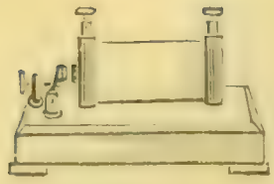
(*Parts of Coil Machines.*)

2293 **Steel Spring Contact Breaker,** with Brass Screws and Patinum Points for Induction Coil—

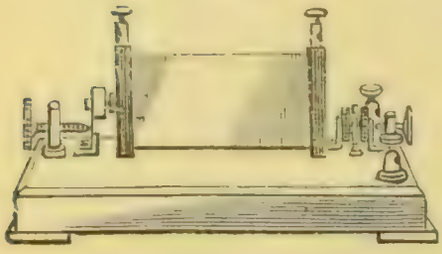
the set, each 2/9, 3/6, 4/6 and 0 5 3

2294 **Small Electro Magnet,** for Contact Breaker 0 1 9

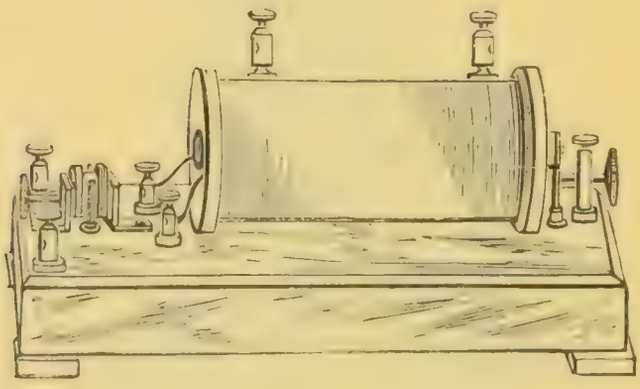
2295 **Spring Contact Breaker,** with Screw and Platinum Points per set 0 5 0



2296

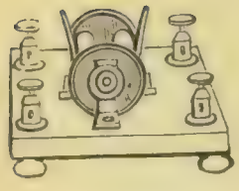


2298

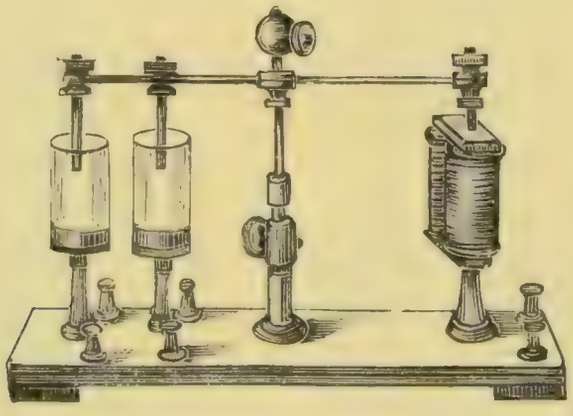


2298

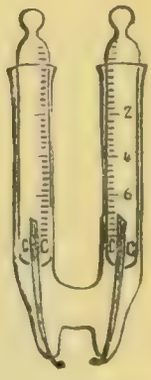
2296	**Induction Coil,** Ruhmkorff's, will give $\frac{1}{4}$ inch Spark ...	£0	7 6
2297	,, ,, with ordinary Commutator, $\frac{5}{16}$ inch Spark ...	0	10 6
2298	,, ,, with Ruhmkorff's Commutator, $\frac{7}{16}$ inch Spark	1	0 0
2299	,, ,, ,, ,, $\frac{9}{16}$,, ,,	1	10 0
2300	,, ,, ,, ,, $\frac{13}{16}$,, ,,	1	17 6
2301	,, ,, ,, ,, $1\frac{3}{16}$,, ,,	2	10 0
2302	,, ,, ,, ,, 2 ,, ,,	4	0 0
2303	,, ,, ,, ,, 3 ,, ,,	7	0 0
2304	,, ,, ,, ,, 4 ,, ,,	9	0 0
2305A	,, ,, ,, ,, 5 ,, ,,	12	12 0
2306A	,, ,, ,, ,, 6 ,, ,,	15	0 0



2307

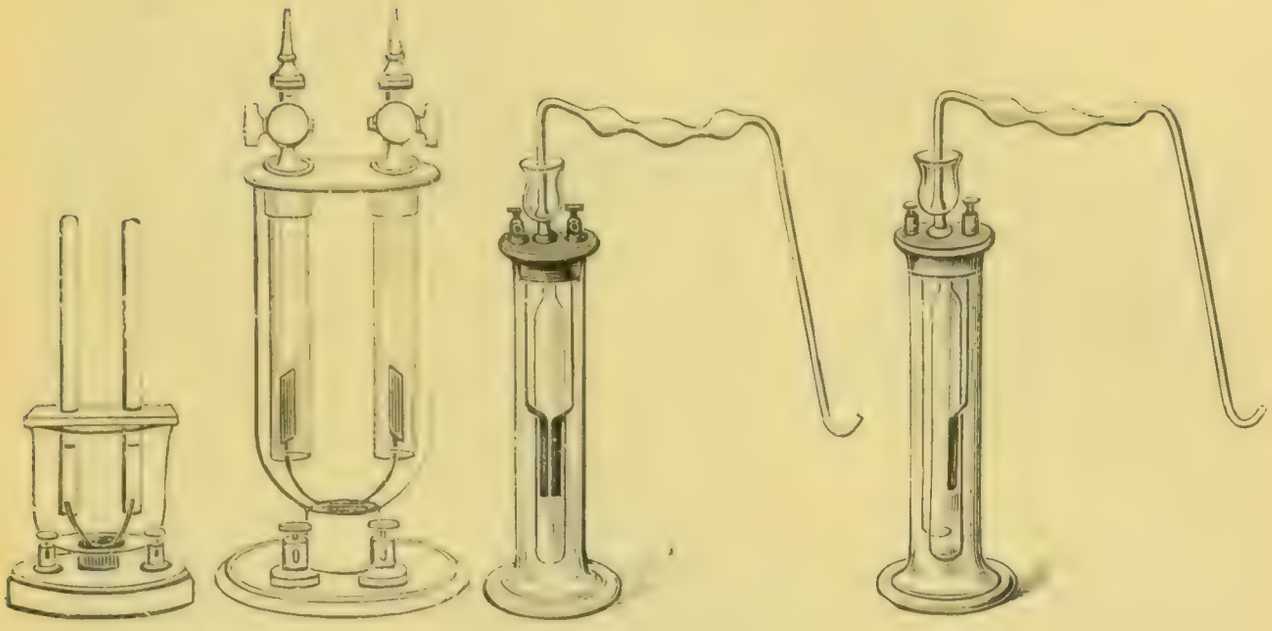


2308



2309

2307	**Commutator**, on Mahogany Stand, for changing the current	£0	10 6
2308	**Foucault's Mercury Break**, for use with Induction Coils ...	2	10 0
	,, ,, ,, with Contact Breaker ...	3	5 0
2309	**Decomposing Water Tubes**, graduated with Platinum Electrodes ... ... small 3/, larger	0	4 0



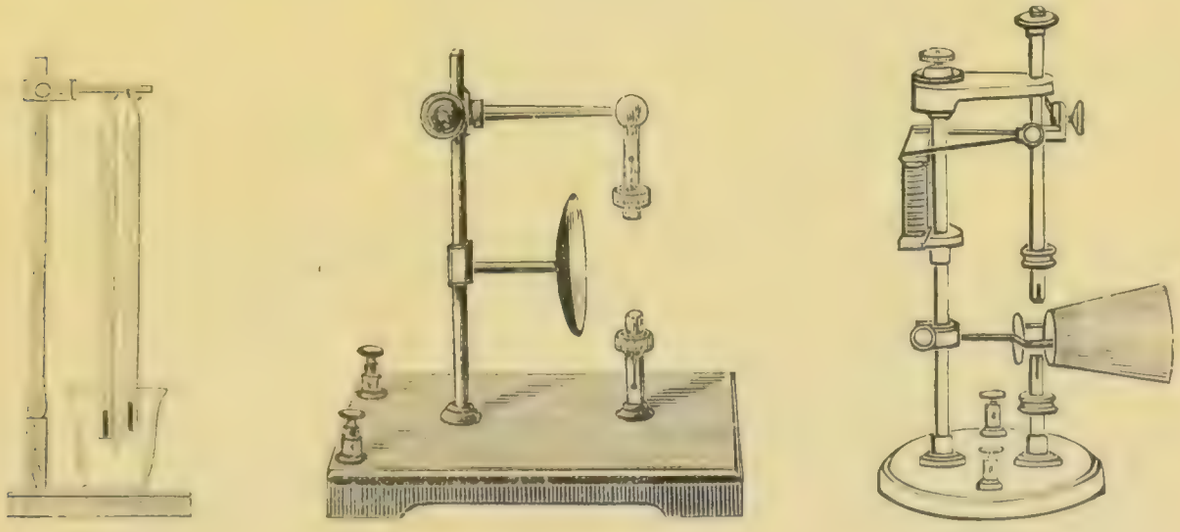
2310 2311 2312 2312A

2310 **Decomposing Water Apparatus**, on Stand, with 2 Tubes, 8/6 and £0 10 0

2311 ,, ,, ,, larger, for Lecture Table 1 5 0

2312 ,, ,, ,, Bunsen's, with Gas Delivery Table ... 0 8 6

2312A **Bunsen's Apparatus**, for preparing pure Hydrogen Gas ... 0 8 6



2313 2315 2317

2313 **Decomposing Water Apparatus**, 2 Graduated Tubes, Platinum Electrodes, and Stand £0 8 6

2315 **Electric Light Carbon Holders**, on Stand, with Rackwork 0 12 0

2316 ,, ,, ,, ,, ,, and Reflector... 0 15 0

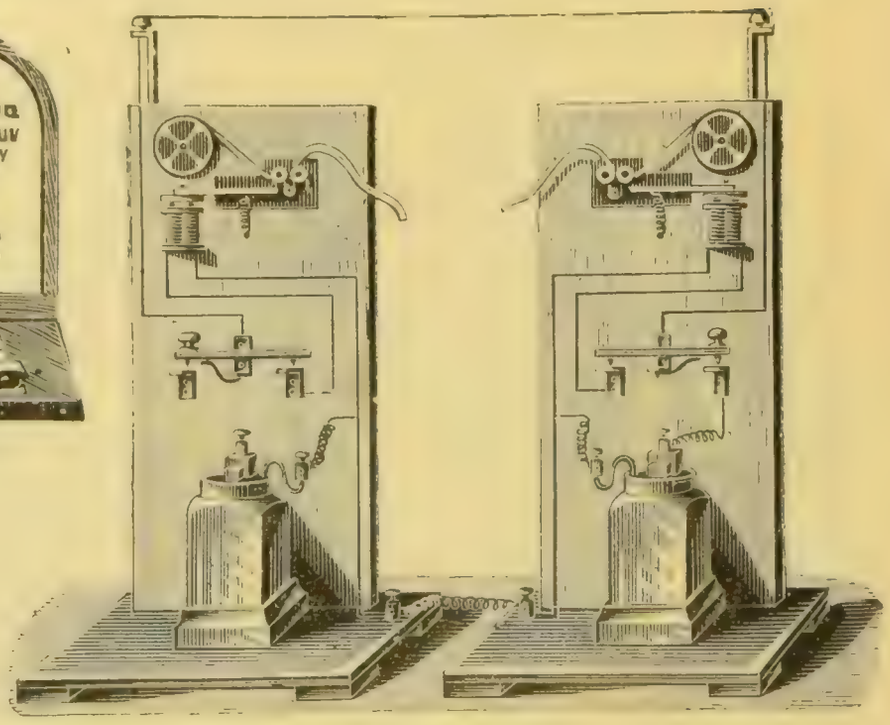
2317 ,, **Lamp**, with Cone Reflector... ... ... 2 0 0



2319



2317B



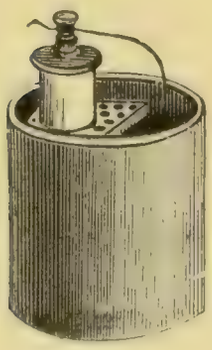
2320A

2317B **Carbon Holder**, new form, for Arc Lamp, mounted on Mahogany Base £0 10 6

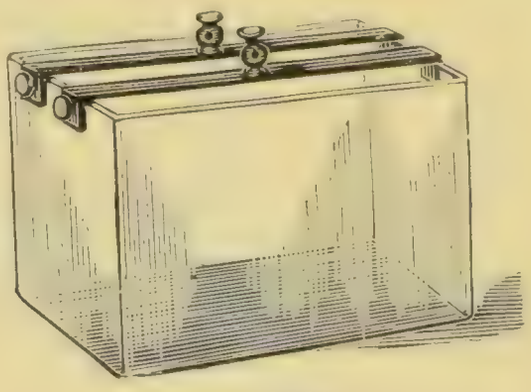
2319 **Needle Telegraph,** for Table use or Lecture Demonstration, per pair 1 7 6

2320 ,, ,, with fine Wire Coils and Bell, a practical instrument ... ... per pair 2 15 0

2320A **Telegraph Model** (Morse), Double Station, with Clockwork arrangement, complete with Leclanche Battery, per pair 5 5 0



2321

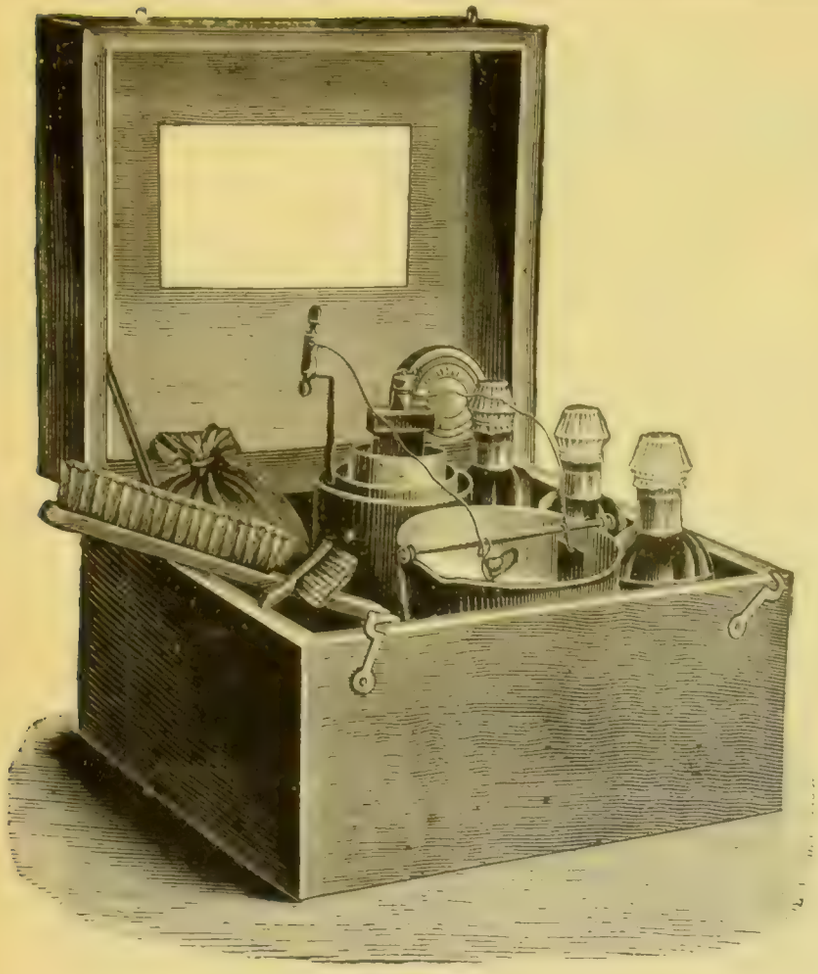


2322

2321 **Electrotype Apparatus,** Single Cell, complete ... £0 3 0

2322 **Decomposing Trough**, Earthenware, for Electro-plating, &c., with 2 Bars and Screws, $6\frac{1}{4} \times 4 \times 5\frac{1}{2}$ in. 0 6 0

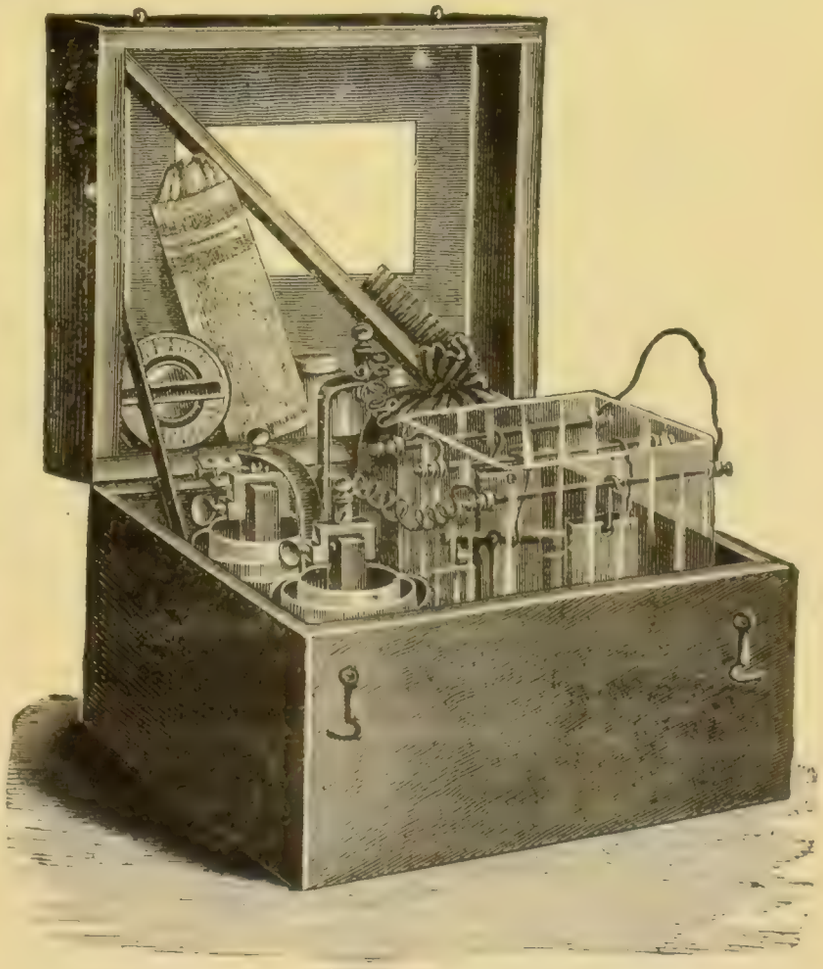
2323 ,, ,, ,, ,, $12\frac{1}{2} \times 8\frac{1}{2} \times 8\frac{1}{2}$ in. 0 12 6



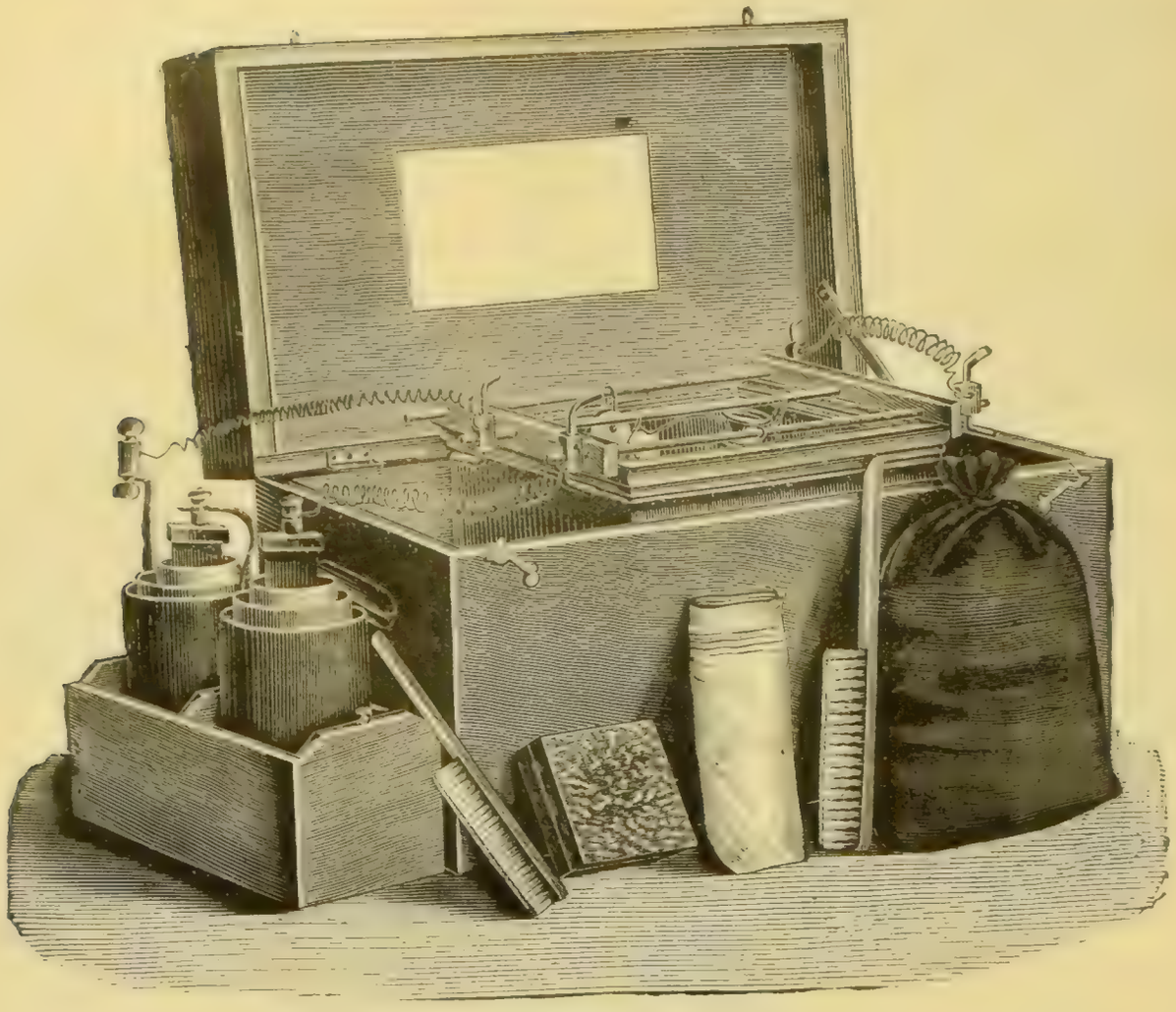
2323A

2323A **Gold and Silver Plating Set**, complete in case with Instructions, containing 1 Bunsen Battery, 1 pint Enamelled Dish, 1 bottle each Copper, Silver and Gold Solution, 1 Scouring Brush, 1 Brass Scratch Brush, Pumice Stone Powder, Sawdust, 1 Patent Chamois Leather Cloth, Insulated Copper Wire and Terminals ... £1 15 0

2323B **Nickel Plating Set**, complete in case with Instructions, containing 2 Bunsen Batteries, 1 Glass Tank 4 × 4 × 5 in., 2 Anode Rods with Clamping Screws, 1 Object Rod with Clamping Screw, Insulated Copper Wire, Prepared Nickel Salts, best Pure Nickel Anodes with Hooks, 1 Scouring Brush, Pumice Stone Powder, Sawdust, 1 Patent Chamois Leather Cloth ... £1 10 0



2323B

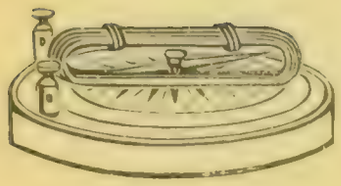


2323c

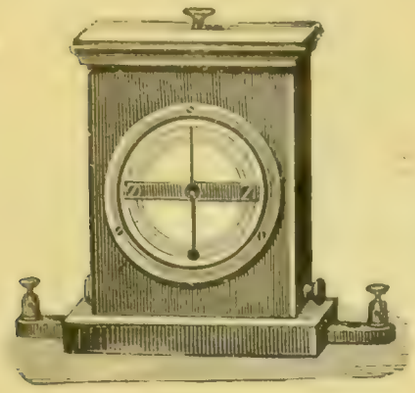
2323c **Nickel Plating Set,** larger size, complete in case with Instructions, containing 2 Bunsen Batteries, 1 Stoneware Tank 8×8×8 in., 2 Anode Rods with Clamping Screws, 1 Object Rod with Clamping Screw, Insulated Copper Wire, Prepared Nickel Salts, Nickel Anodes with Hooks, 1 Scouring Brush, Pumice Stone Powder, Sawdust, 1 Chamois Leather Cloth £2 5 0

2323d **Electrotype Apparatus,** for Amateurs, complete in case with Instructions, containing 1 Bunsen Battery, 1 Glass Tank 4×4×5 in., 1 Anode Rod with Clamping Screw, 2 Rods and Clamping Screws for Moulds, Insulated Copper Wire, Sulphate of Copper, Pure Copper Anodes and Hooks, Electrotyper's Powdered Plumbago, 1 Plumbago Brush 1 10 0

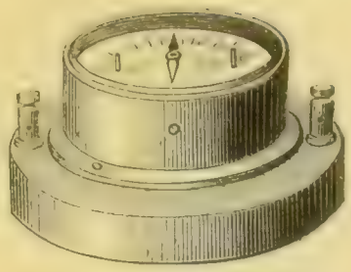
2323e **Electrotype Apparatus,** for Amateurs, larger size, complete in case with Instructions, containing 1 Bunsen Battery, 1 Glass Tank 8×8×8 in., 1 Anode Rod with Clamping Screw, 2 Rods and Clamping Screws for Moulds, Insulated Copper Wire, Sulphate of Copper Pure Copper Anodes and Hooks, Electrotyper's Powdered Plumbago, 1 Plumbago Brush 2 5 0



2324



2324A

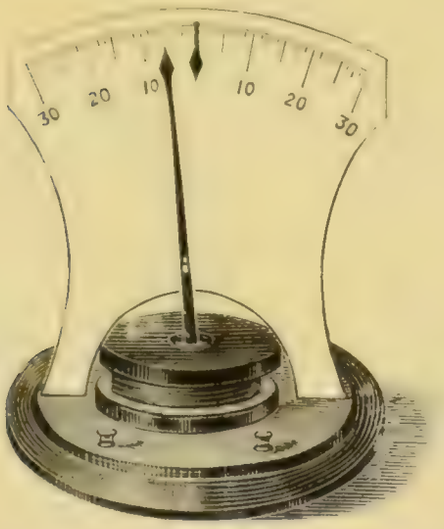


2325

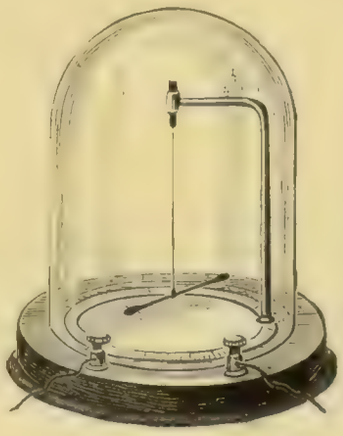
2324 **Galvanometer,** for detecting the presence of galvanic currents by the amount of deflection of the Needle, with graduated Scale, on Mahogany Stand £0 7 0

2324A ,, Vertical, in Bronzed Metal Case, on Polished Wood Stand 1 5 6

2325 ,, Brass body, on Mahogany Frame, Needle with jewelled Centre, Crystal Glass, Silvered, and divided Metal Dial 0 12 6



2325A



2325B

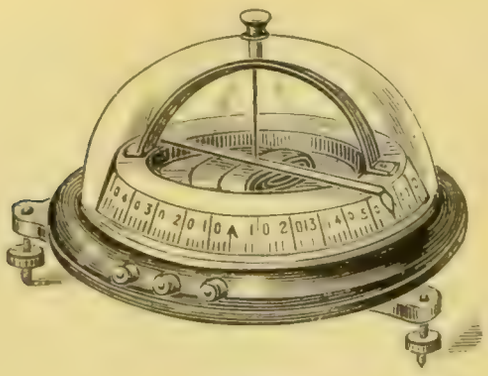
2325A **Galvanometer,** large, for Lecture use, Vertical Form, on Polished Mahogany Base, Zinc Scale, divided to 30° each side, painted in bold figures, Aluminium Pointer, working on Knife Edges £1 15 0

2325B ,, "Walmsley-Mather," Proportional, mounted on Polished Mahogany Base, under Glass Shade—

For low resistance 2 0 0

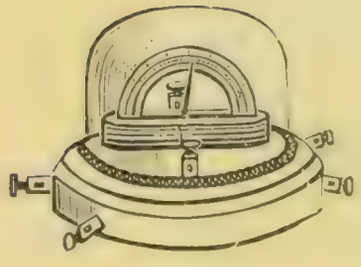
,, high ,, 500 to 600 ohms 2 10 0

,, both high and low resistance 3 10 0

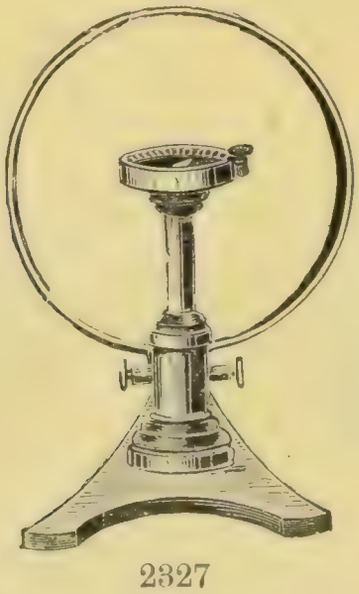


2325c

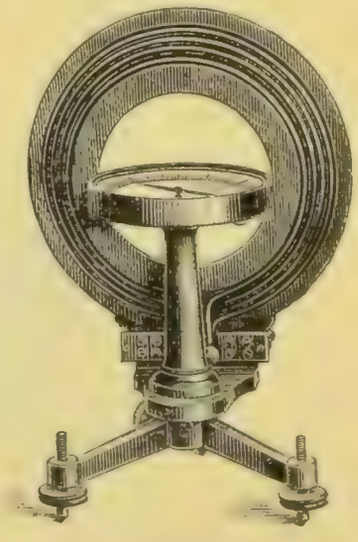
2325c **Large Lecture Galvanometer**, Horizontal Form. The Scale of this Instrument is 12 in. diameter, and consists of a Bevelled Mahogany Ring, the edge of which is inclined at 45° to the horizontal, and divided into degrees, boldly numbered. The Pointer is of a conspicuous form, and being double-ended, is easily seen both by Students and Lecturer. The Coils of the Instrument are wound in such a shape as to make the deflections of the Needle nearly proportional to the current. They are wound to about 20 and 1,000 ohms respectively, so as to render the Instrument suitable for a large variety of experiments. The Base is of Polished Mahogany £8 10 0



2326



2327

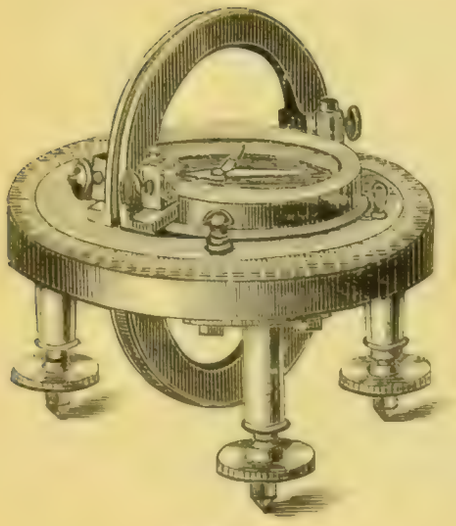


2327A

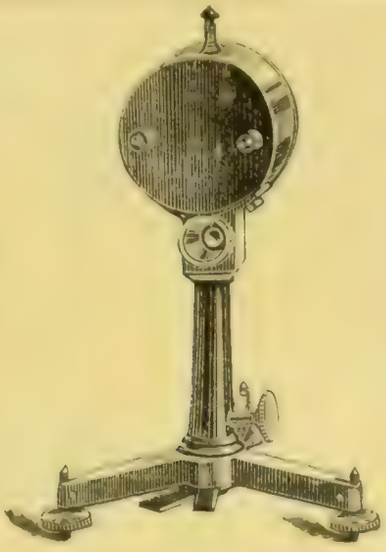
2326 **Galvanometer,** with Upright Metal Disc, graduated, in Glass Shade £0 12 6

2327 ,, **Tangent,** simple form, Copper Ring 11 in. diameter, Needle with Agate Centre, Silvered Dial, mounted on Mahogany Base 1 15 0

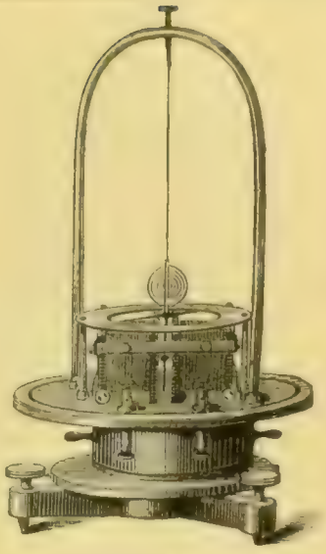
2327A ,, superior make, Gaugain's Form, with five well Insulated Interchangeable Copper Rings, very sensitive Needle on Polished Agate Centre, revolving on Brass Tripod Stand, with Levelling Screws 7 15 0



2329A



2330



2331A

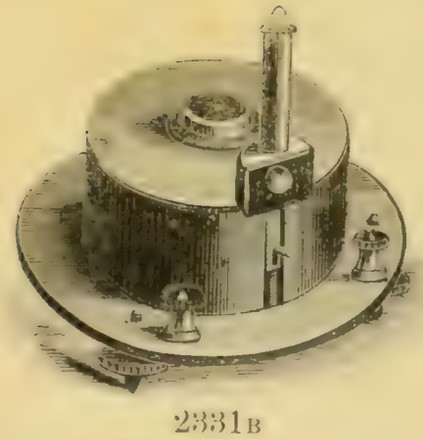
2329A **Galvanometer Tangent,** Siemens and Halske's, with Fine and Coarse Copper Wire, Large and Small Needle, mounted on Tripod Stand, with Levelling Screws ... £12 10 0

2330 ,, Reflecting, Thompson's, Vulcanite Pillar, mounted on Polished Mahogany Base, Boxwood Reel, Removeable Plug, Suspended Mirror, Dead Beat, wound to 100 ohms 6 6 0

200 ,, 7 7 0

2331 ,, Ditto superior make 12 12 0

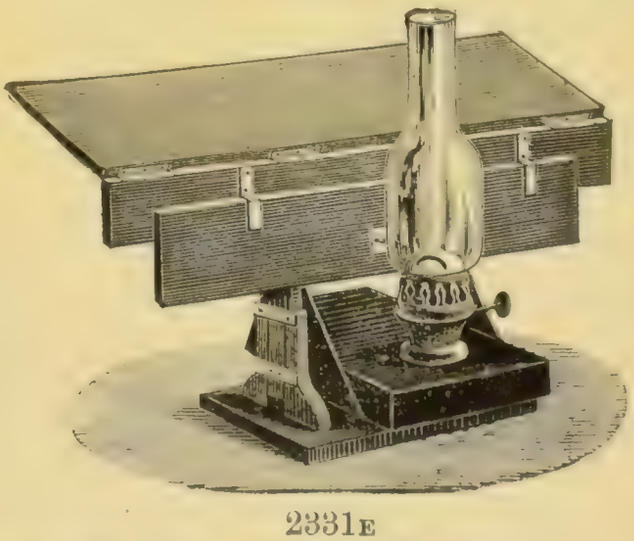
2331A ,, Large Reflecting, Weinhold's, with Regulator, Astatic Needle with Mirror and Long Indicator, and has 2 Coils for Fine and Coarse Currents fitted with Commutator to work either side by side or in sequence together. The Instrument is made to revolve, and all parts are made of materials free from Iron 9 9 0



2331B



2331C



2331E

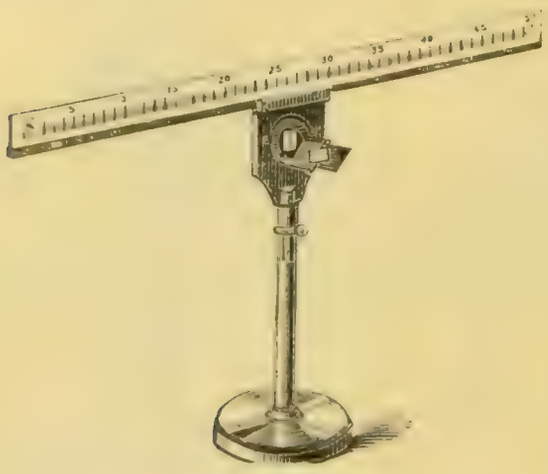
2331B **Galvanometer Tangent,** Reflecting, "Ayrton-Mather," wound to 325 ohms, fitted in Case for travelling, 7 × 7 × 8 in. £5 10 0

2331C **Spare Coil,** for above, from 3 to 325 ohms, Dead Beat or Ballistic 3 3 0

2331D **Spare Mirrors,** for Reflecting Galvanometers ... each 0 3 6

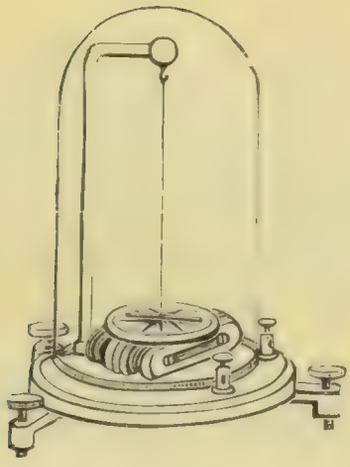
2331E **Scale Stand,** for Reflecting Galvanometers, Black Wood, with accurately divided Paper Scale, with Lamp, complete 1 15 0

2331F **Scale Stand,** with Condensing Lens, in Telescopic Mounting 2 0 0

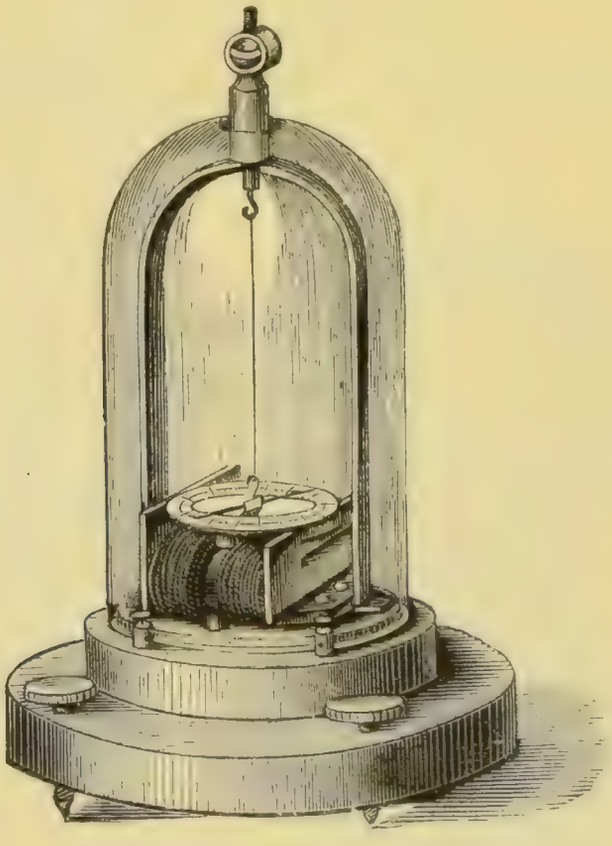


2331G

2331G **Scale Stand,** Semi-transparent, 50 cm. long, divided into millimetres, mounted on Telescopic Stand, on heavy Metal Base. It is constructed to slide horizontally to bring the spot of light to zero, and also has a vertical movement in Pillar. The light is reflected to the Galvanometer by the Universal Mirror, as shown in figure £2 15 0

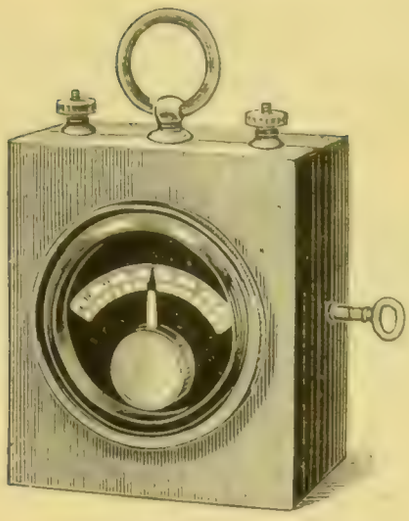


2332



2334A

2332	**Galvanometer Astatic Needle,** in Glass Shade, Silk Suspension	£1	7 6
2333	,, Ebonite Coil Frame, and Adjustment for Suspension and Levelling Screws	2	0 0
2333A	,, with Moveable Coil Frame	3	0 0
2334	,, with Silvered Dial ... ... extra	0	6 0
2334A	,, (Nobili's), superior make, with Aluminium Pointer	3	10 0



2335A

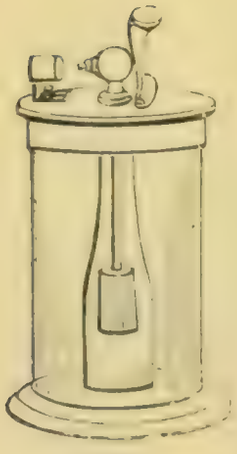


2336A

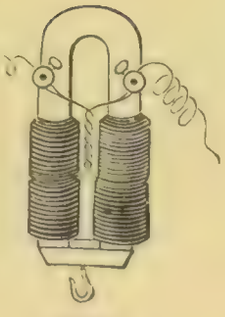
2335A **Galvanometer,** Lineman's Detector, wound with Thin Wire for intensity, very sensitive, in Polished Mahogany Case, with Thick Plate Glass, Bevelled Edges ... £1 5 0

2335B ,, Lineman's Detector, wound with Fine and Coarse Wire for quantity or intensity, 3 Terminals, in Polished Mahogany Case, &c. 1 15 0

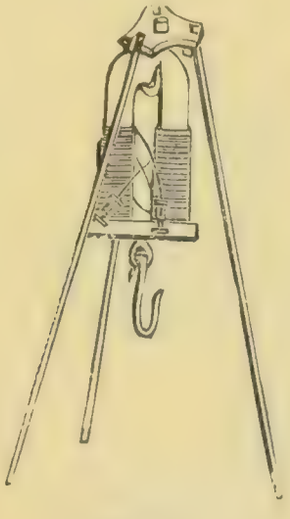
2336A ,, Horizontal, cheap form, with Dial 2½ in. diameter, divided to 90°, 2 Terminals, and Controlling Magnet to bring the Needle to zero, mounted on Walnut Base ... 0 5 0



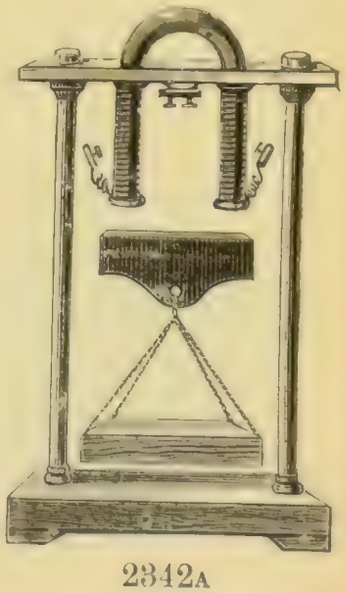
2337



2338



2342



2342A

2337 **Dobereiner's Lamp,** complete ... each 10/6 and £0 15 0

Platinum Sponge Spirals, for above ... each 0 1 0

2338 **Magnet, Electro,** Soft Iron, covered with Insulated Copper Wire, with Hook or Keeper for suspending Weights when attached to Battery, diameter of Iron Core ½ inch 0 2 6

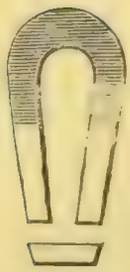
2339 ,, ,, with pair Connecting Screws ,, ⅝ ,, 0 3 6

2340 ,, ,, ,, ,, ,, ¾ ,, 0 7 0

2341 ,, ,, ,, ,, ,, 1 ,, 0 10 6

2342 ,, ,, on Tripod Stand ,, ,, 1 ,, 0 17 6

2342A ,, ,, very powerful, large, for Lecture use, mounted on Mahogany Base 2 10 0



2343



2344



2345B

2343 **Magnets, Horseshoe,** best English make, strongly magnetised –

2½	3	3½	4	5	6	7	8	9	10	11	12 in.
3d.	4d.	6d.	8d.	1/2	1/6	2/6	2/9	4/	5/	6/	7/6 each

2344 **Magnets, Bar Steel,** Polished, with Keepers—

4	6	8	10	12 in.
10d.	1/4	2/6	4/	4/6 per pair

2345 .. .. .. 12 × 1½ × ½ in., pair 8/ ; each £0 4 6

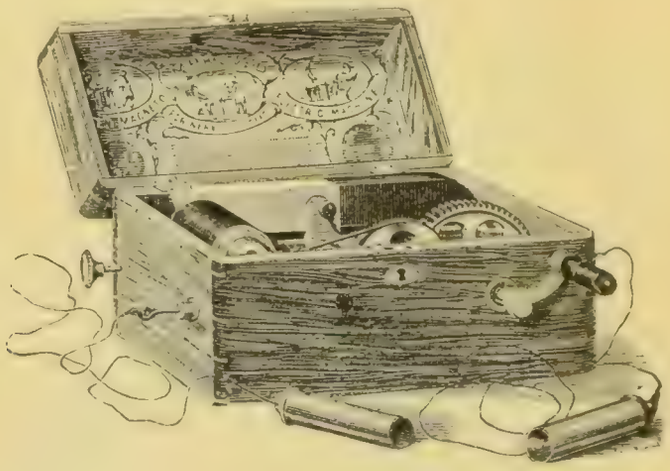
2345A **Polished Pine Boxes,** with Hinges, to hold 1 pair of above Magnets—

4	6	8	10	12 in.
1/	1/	1/6	1/6	1/6 each

2345B **Compound Straight Bar Magnets,** suitable for long circuits, with Soft Iron Pole Pieces, connecting the four 5 in. Bars together, fitted with Adjusting Screws ... each 0 5 6



2346



2347

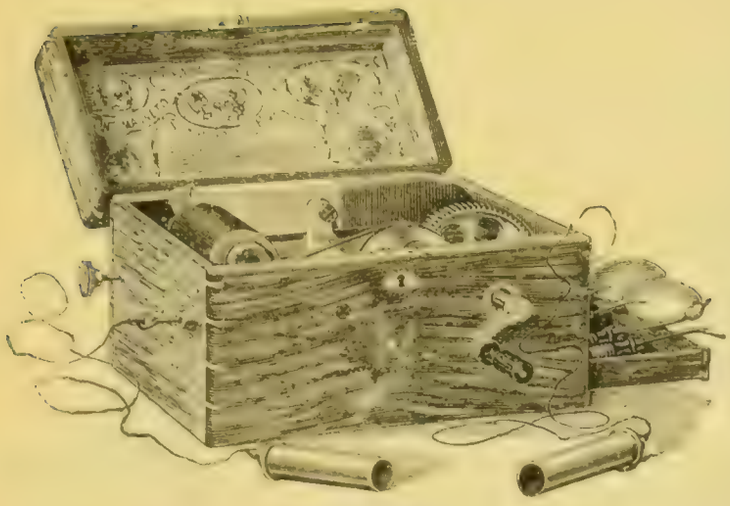
2346 **Magneto-Electric Machine,** with Handles, for giving Shocks, in Pine Case £0 16 6

2346A ,, ,, ,, in Mahogany Case 0 18 6

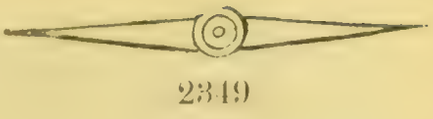
2346B ,, ,, small Pocket Form ,, 1 0 0

2347 ,, ,, for Medical Purposes, with Handles, Directors, &c., in Mahogany Case ... 1 8 6

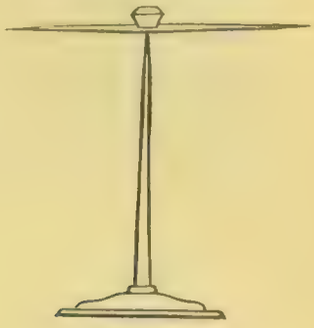
234 A ,, .. with Indicator 1 15 6



2348



2349



2350

2348 **Magneto-Electric Machine,** superior make, with Drawer and extra Directors, &c. ... £2 0 0

2348A ,, ,, with Indicator 2 10 0

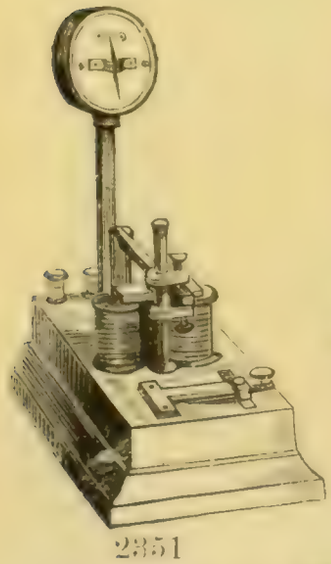
2349 **Magnetised Needle,** with Brass Pivot—

2	3	4	6 in. long
1/3	1/4	1/6	1/8 each

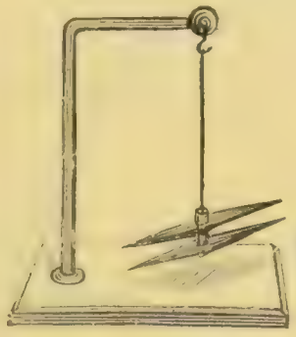
2350 ,, ,, Vertical, on Brass Stand, with Steel Point ... 2/9, 2/10, 3/ and 0 3 6

2350A ,, ,, with Agate Centres—

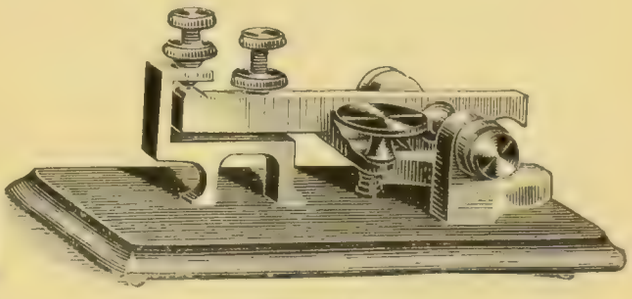
2	3	4	6 in. long
1 6	2/	2 6	3/6 each



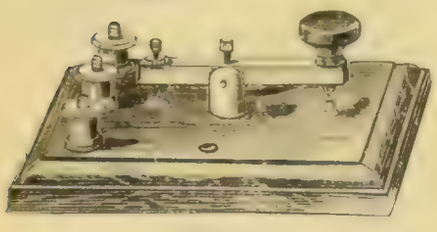
2351



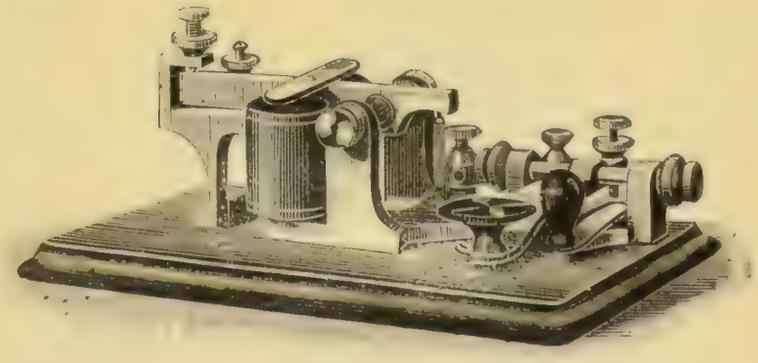
2352



2351B



2351A



2351C

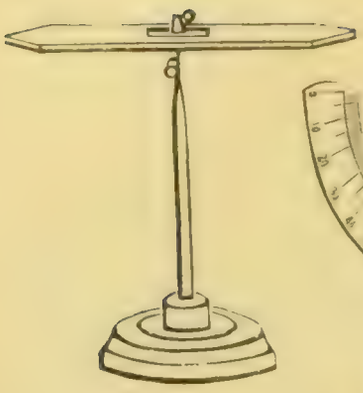
2351 **Morse's Telegraph Sounder** £3 15 0

2351A **Morse's Key**, mounted on Mahogany Base, best make ... 0 10 6

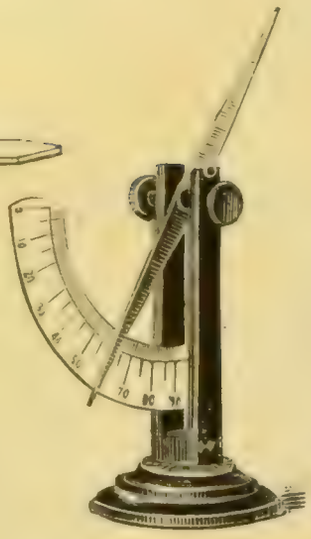
2351B ,, **and Sounder,** Combined 0 17 6

2351C ,, ,, on one Board ... 1 10 0

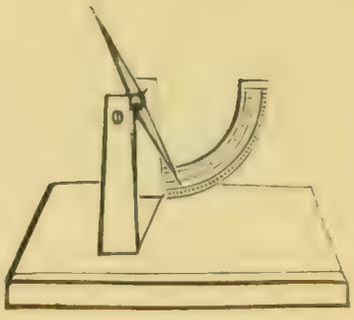
2352 **Needle, Astatic,** simple, on Polished Mahogany Stand ... 0 7 6



2353



2353A



2354



2355B

2353 **Needle Dip,** Polished Steel, on Pivot, with Stand ... £0 10 6

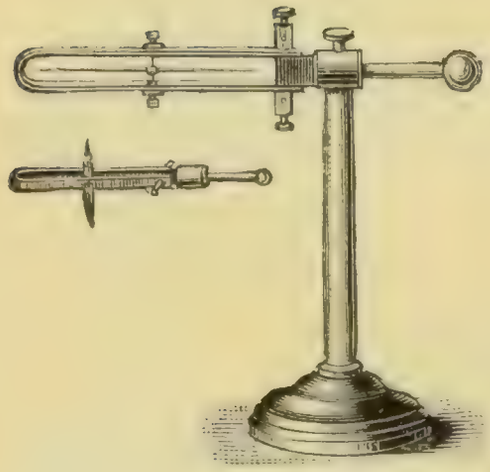
2353A ,, best make, on Brass Stand, with Silvered Metal Scale 0 8 6

2354 ,, with Graduated Arc, on Mahogany Stand ... 0 13 0

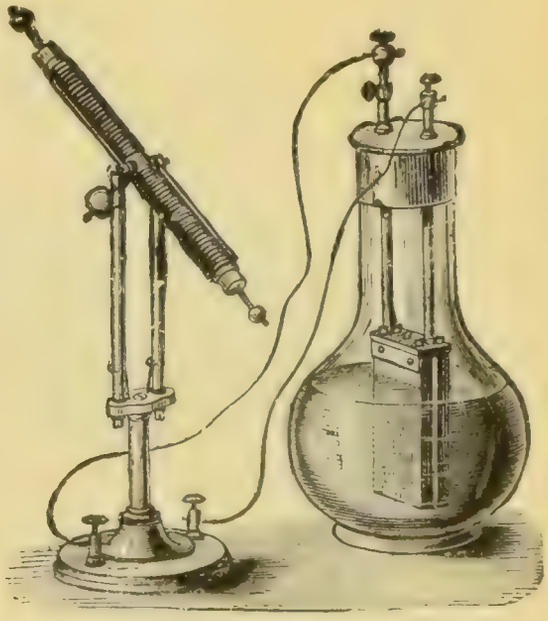
2355 ,, without Arc 0 7 6

2355A ,, with one Graduated Arc, without Levelling Screws 2 0 0

2355B ,, with Graduated Arc, Vertical and Horizontal Movement, with two Graduated Arcs, with Levelling Screws 3 7 6



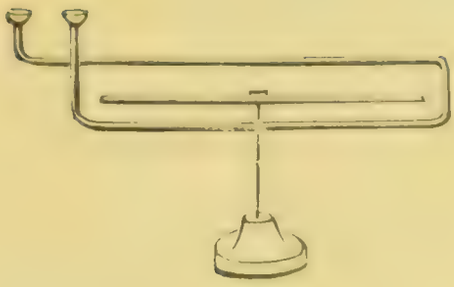
2355C



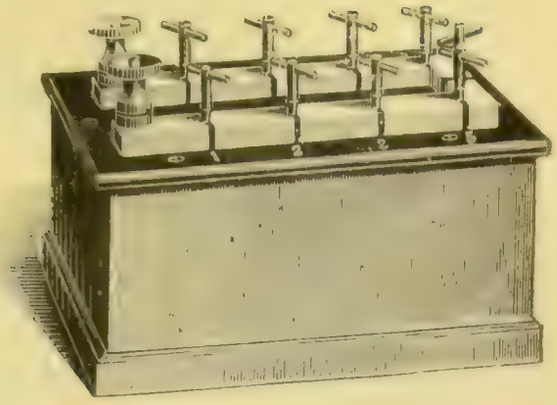
2355D

2355C **Needle Dip,** Needle supported on Brass Bow, mounted on Stand £0 17 6

2355D **Schumann's Apparatus,** to show the attraction and repulsion of the earth's magnetism, consisting of a Cylindrical Iron Rod, which swings on two Knife Edges. This Rod is wound in such a manner with Insulated Copper Wire that the current flows from one of the supports through the length of the Wire Coils to the other Knife Edge. Price, without the Battery 1 17 6



2356



2357A

2356 **Oersted's Apparatus,** for showing the deflection of the Magnetic Needle by a Copper Wire each 3/6 and £0 9 0

2357A **Resistance Boxes,** for educational use, wound with Platinoid or German Silver Wire, adjusted with great accuracy, 1 part in 500 guaranteed, Solid Brass Plugs, mounted in Mahogany Case—

From 1 to 50 ohms.	Total 100 or 210 ohms	4 15 0
,, 1 ,, 500 ,,	,, 1·110 ohms	6 10 0
,, 1 ,, 5,000 ,,	,, 11·110 ,,	8 8 0

2357B **Resistance Boxes,** with Wheatstone's Bridge, two pairs Proportional Coils, with two Keys. Total 110 or 210 ohms 7 0 0

2357C ,, in Case 7 15 0

2357D **Carbon Megohm** 2 10 0



2357E

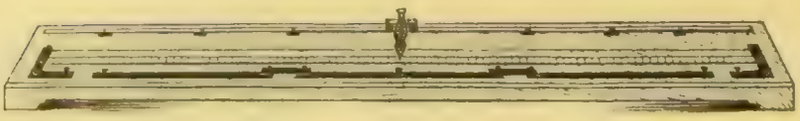


2357F

2357E **Resistance Coil,** "Standard," Improved Pattern, allowing the temperature to be rapidly and accurately ascertained, with Thermometer, in Case, complete £4 15 0

2357F **Standard Coils,** on Ebonite Bobbin, fitted in Brass Case, wound with Platinoid or German Silver Wire—

1 or 10 ohms, each	1 5 0
100 ,, 1,000 ,, ,,	2 0 0



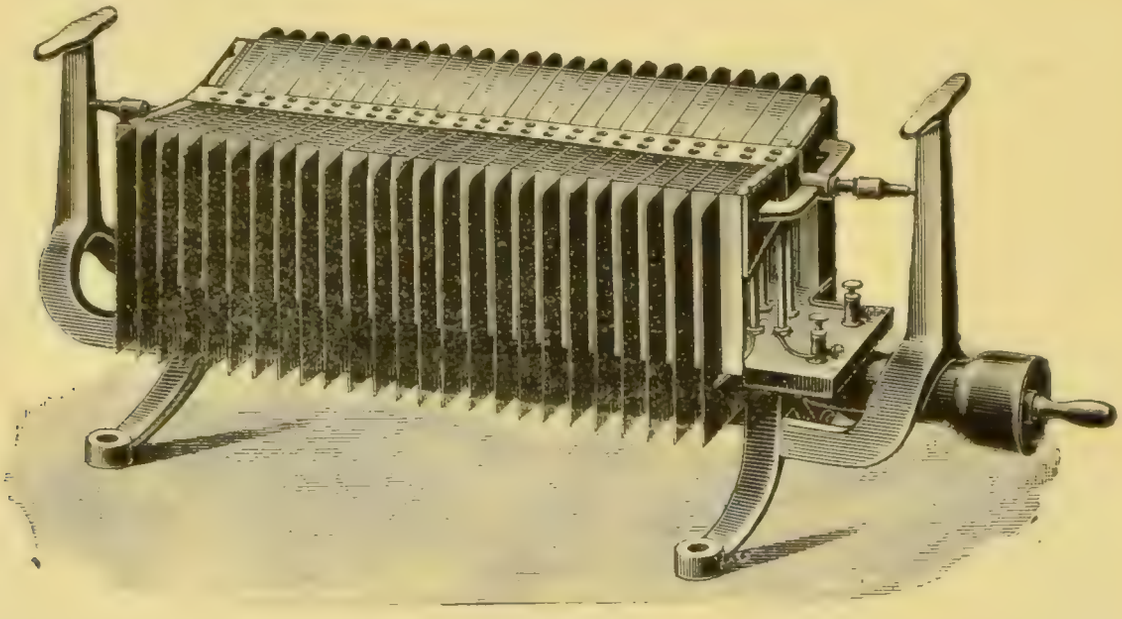
2358

2358 **Wheatstone's Bridge,** for use with Rheostat £2 2 0

2358A ,, ,, ½ metre long, German Silver Wire, on Polished Mahogany Stand ... 1 2 6

2358B ,, ,, Improved Form, with Dovetail Slide, German Silver Wire, best quality ... 4 4 0

2358C **Poggendorff Metre Bridge,** best form, with Jockey ... 7 10 0

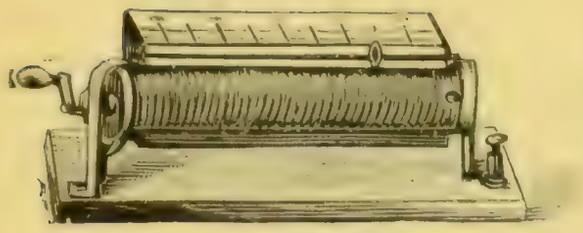


2358D

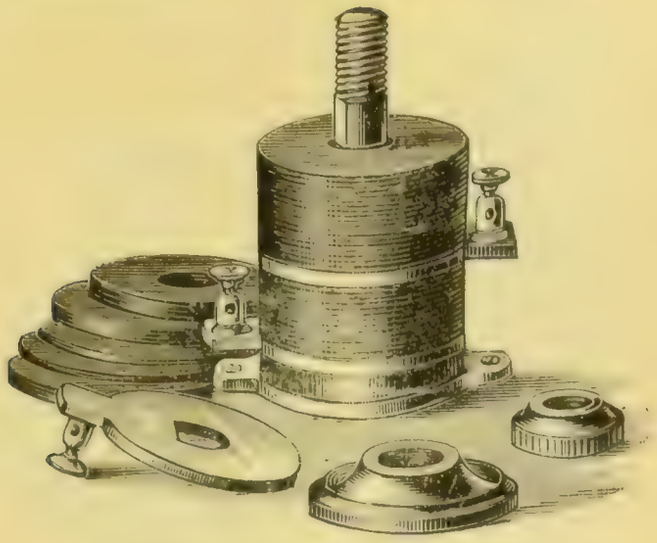
2358D **Thermopiles,** "Gulcher's"—

No.	1	2	3
Elements	26	50	66
Volts	1½	3	4
Ampères	3	3	3
Internal Resistance	·25	·50	·65 ohms
	£6/7/6	£12	£14/5 each

Gulcher's Thermopiles, for connecting to the Gas Supply, offer the most advantageous substitute for Galvanic Batteries. The great advantages of these Thermopiles are: Constant Electro-motive Force; small consumption of Gas; no Vapours or Smell; no Polarisation, and, therefore, no Exhaustion. It is suitable for Electro-plating, Coppering, Gilding, charging Accumulators, and for replacing all Primary Batteries.



2359

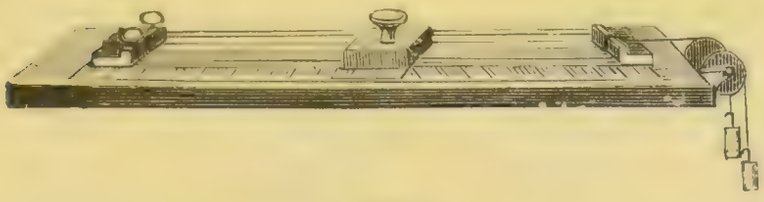


2359B

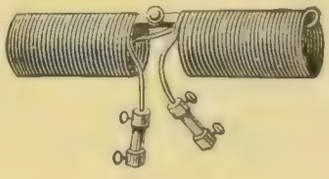
2359 **Rheostat**, Wheatstone's, on Insulated Cylinder, with German Silver Wire, mounted on Polished Mahogany Base ... £2 10 0

2359A ,, Wheatstone's, two ways, with one Brass and one Vulcanite Cylinder on which the German Silver Wires revolve 3 10 0

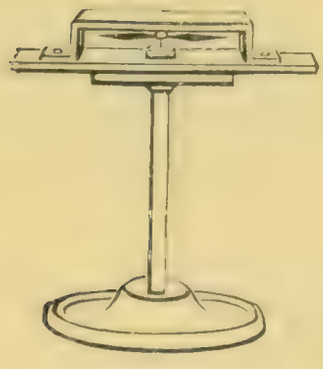
2359B ,, Varley's, Carbon, consisting of a number of Carbon Discs. The resistance can be gradually varied from about 10 ohms by carefully screwing down the Nut 1 1 0



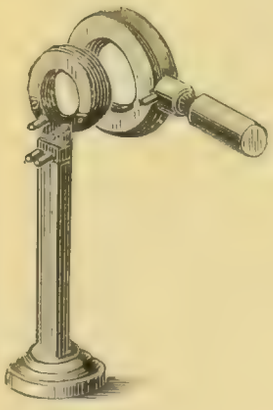
2360A



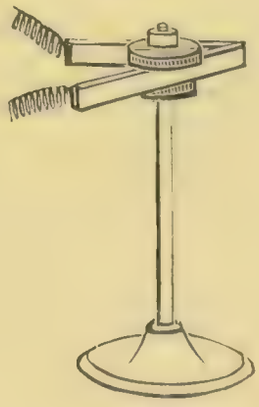
2362



2361



2363A



2364

2360A **Rheocord**, Poggendorff's, with 2 Platinum Wires one metre long, mounted on Polished Mahogany Base, with Brass Scale graduated in centimetres £3 10 0

2361 **Seebeck's Rectangle**, or Frame of Bismuth and Antimony, with Magnetic Needle suspended 0 10 6

2362 **Solenoid**, for converting a Bar of Soft Iron into a Magnet .. 0 5 0

2362A **Apparatus**, to show Induction (*see Block* 2277A)... ... 1 1 0

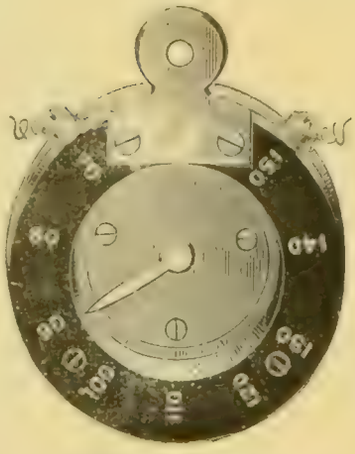
2363 **Spirals**, on Board ... ... per pair 0 5 0

2363A **Two Coils**, of Thin and Thick Wire, mounted on Stand ... 0 18 6

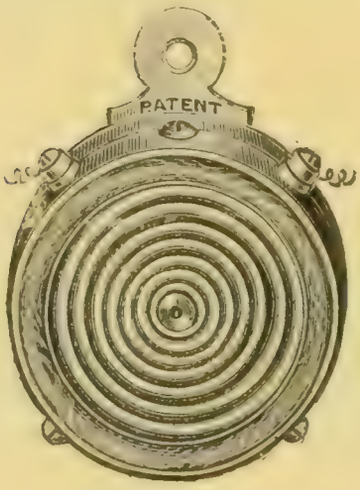
2364 **Thermo-Electric Pair**, of Bismuth and Antimony, V shape, with Wire for connecting with Battery, on Brass Stand ... 0 8 6



2365



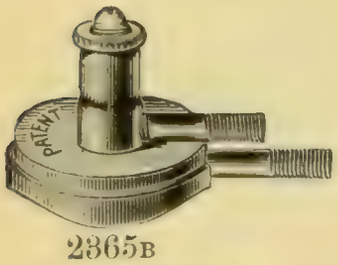
2365A—Front



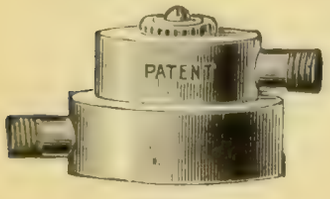
2365A—Back

2365 **Thermometer Electric Alarum,** for Drying Closets, &c., can be adjusted to ring a Bell at any required temperature ... £0 7 6

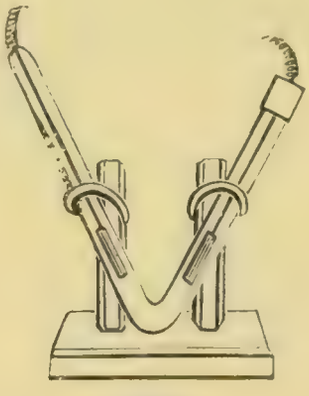
2365A **Patent Adjustable Fire Alarum,** or Heat Indicator, consisting of Sensitive Diaphragms, which can be adjusted from 0° to 200° F. 0 12 6



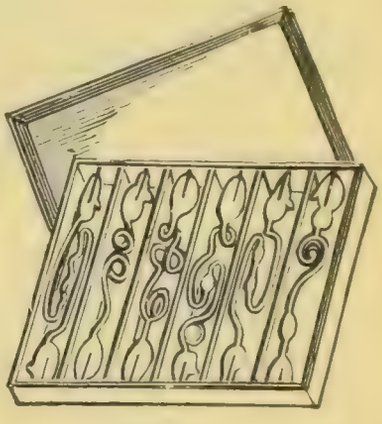
2365B



2365C



2366



2367

2365B **Patent Heat Regulator,** for Gas Fires, Urns, &c., where Gas is used as a source of heat ... for Urns £0 10 6

2365C ,, ,, ,, for Gas Fires 0 12 6

2366 **V Tube,** with Electrodes, for Decomposition of Neutral Salts, on Mahogany Stand 0 7 6

2367 **Vacuum Tubes,** for showing the brilliant effects produced by the Electric Current in vacuo—

Set of 4 Tubes, various designs, 4 to 5 in., each 1/6, set in box 0 5 6
,, 6 ,, ,, 4 ,, 5 ,, ,, 1/6 ,, 0 8 6
,, 6 ,, ,, 6 in. ,, 1/9 ,, 0 9 6
,, 6 ,, ,, 8 ,, ,, 2/6 ,, 0 12 6
,, 6 ,, ,, 10 ,, ,, 5/0 ,, 1 2 6
,, 8 ,, ,, 14 ,, for Demonstration ... 2 10 0

2368 **Spectrum Tubes,** containing the following Gases—

O, H, N, CO_2, HO, Cl, HCl, Br, I, Cy, HCy, NO, NO_2, each £0 3 0

2369 **Phosphorescent Powders,** in flat Tubes, in Case, the Phosphorescence being produced on exposure to light—

Set of 3 different Colours	0	5	0
,, 5 ,,	0	8	0
,, 7 ,,	0	13	0

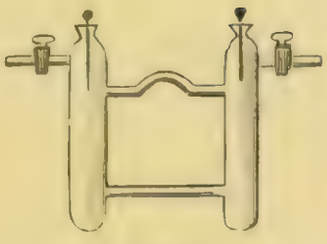
Single Tubes can be supplied at 1/9 each.

2369A **Fluorescent Liquids,** in sealed Glass Tubes, 1 in. long, in sets of—

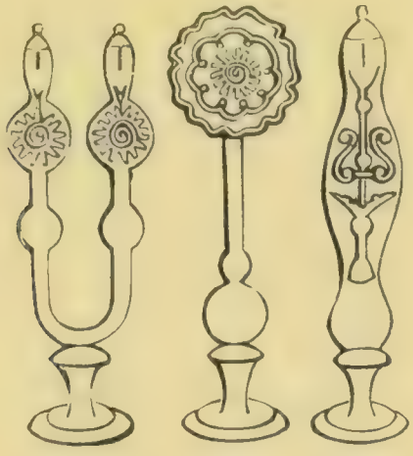
6	8	12
10 6	14 6	21



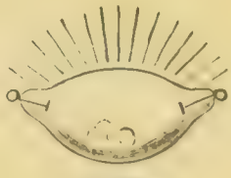
2370



2371



2372A 2372 2372



2372C

2370 **Vacuum Tube,** with 2 Stopcocks and Platinum Wires, for filling with Gases for Spectrum Analysis... £0 9 0

2371 ,, ,, with Stopcocks and Platinum Wires, to show the length of Spark 0 10 0

2372 ,, **Tubes,** various designs, height 10 in., mounted on Wooden Stands... ... each 0 8 6

Height 14 in., on Wooden Stand ,, 0 13 6

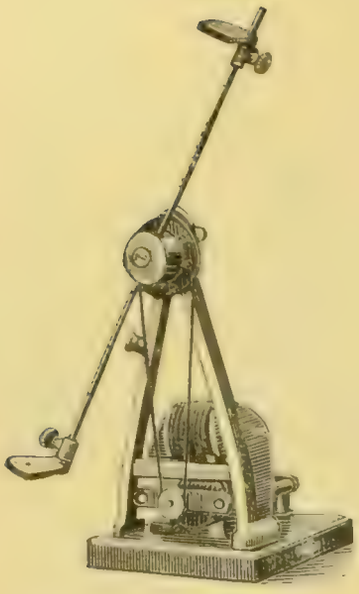
2372A ,, ,, **U** shape, height 10 in. ... ,, 0 10 6

2372B ,, ,, ,, 4 Limbs... ... ,, 0 16 6

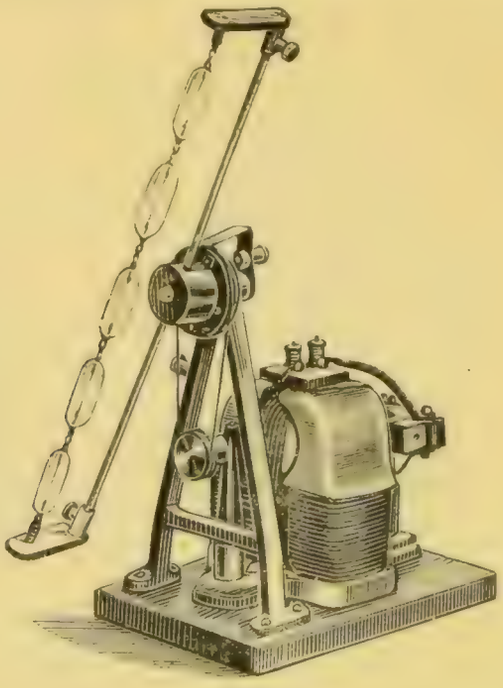
Larger sizes can be supplied, from £1 to £2 each.

2372C **Crook's Vacuum Tube,** filled with Chemical Substances, each 0 7 6

2372D **Set of 3 Glass Bulbs,** to show Phosphorescence, Uranium German, and English Glass 0 18 6



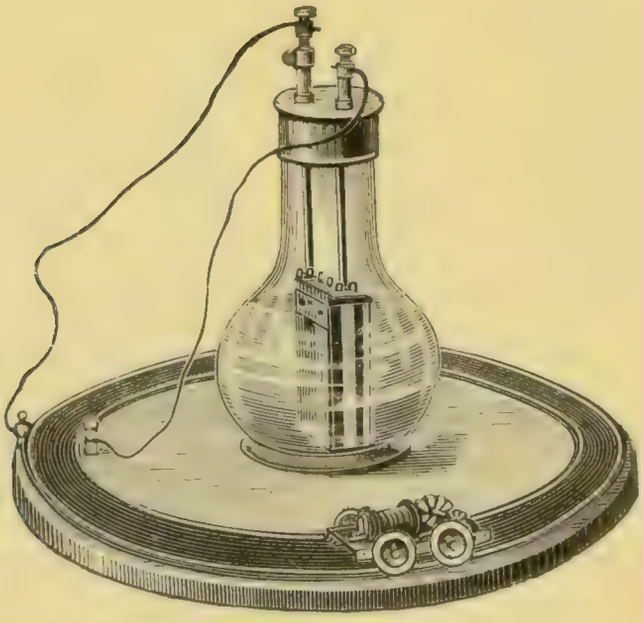
2373A



2373B

2373A **Vacuum Tube Revolver,** or small Magnetic Engine, for 4 to 10 in. Tubes, improved pattern, English make ... £1 1 0

2373B „ „ with 5 Coloured Incandescent Lamps, which can be used on continuous or alternating Circuits 3 0 0



2373C

2373C **Electrical Railway,** with Motor, on Polished Wood Stand, without Battery £1 10 0

2374 **Copper Wire,** Insulated, double covered with Cotton, for Electrical purposes—

No.	16	18	20	22	24	26	28	30	32	36	38
Yds. per lb. bare about	28	48	69	123	177	300	434	570	918	1,736	2,000
Per lb.	1/9	1/10	2/4	2/6	3/	3/3	3/6	4/	5/	6/6	12/

Quantities less than 1 lb. will be charged at higher rates.

2375 **Copper Wire,** Tinned, double covered with Cotton, Paraffin, and India Rubber, adapted for Telephones, Electric Bells, &c., in lengths of 110 yards—

No. 22, SWG	...	...	per length	£0	5	0
,, 20 ,,	...	...	,,	0	8	6
,, 18 ,,	...	...	,,	0	14	6

2375A ,, Same as above, but single covered—

No. 22, SWG	...	...	per length	0	4	3
,, 20 ,,	...	...	,,	0	6	6
,, 18 ,,	...	...	,,	0	12	0

2376 ,, Double twin Wires, Insulated, for Telephone or Electric House Bells—

No. 22, SWG	...	...	per yard	0	0	2
			Lengths of 110 yards	0	10	6

2377 ,, Double covered with Silk, best quality—

No.	16	18	20	22	24	26	28	32	36	38
per lb.	4/	4/6	5/6	5/9	6/6	7/6	9/	12/	15/	20/

2377A ,, Single covered with Silk—

No.	16	18	20	22	24	26	28	32	36
per lb.	3/3	3/6	3/9	4/	4/3	4/9	5/6	7/	11/6

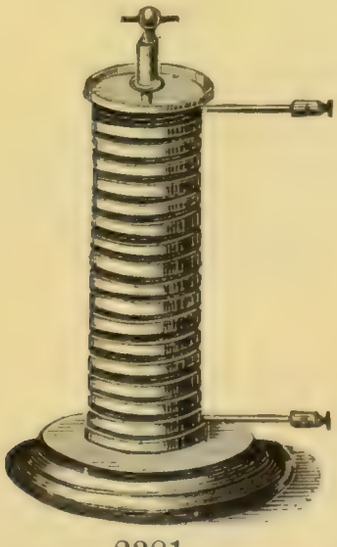
Quantities less than 1 lb. will be charged at higher rates.

2379 **Copper Wire,** covered with Guttapercha—

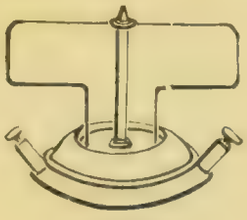
No. 20, insulated to 14	...	per yard	0	0	1½
,, 110 yards ...	...	...	0	9	0
No. 18, insulated to 12	...	per yard	0	0	2½
,, 110 yards ...	...	...	0	16	6

(*Other sizes to order.*)

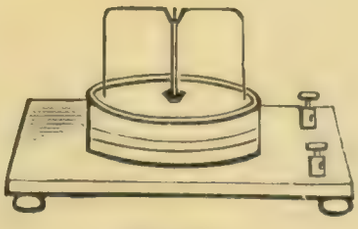
2380 **Flexible Silk Wire Cord** (*see page* 381) per yard 4d. and 0 0 5



2381



2382



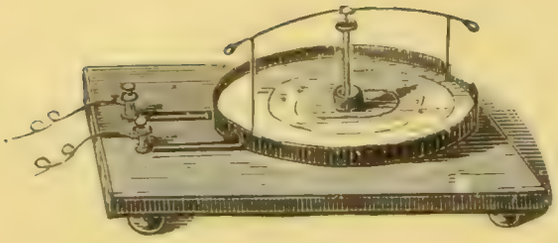
2383



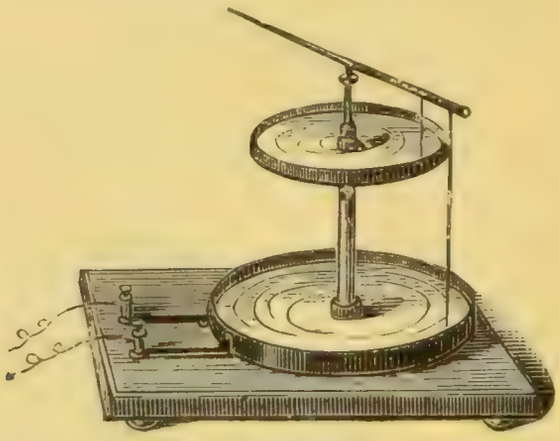
2384

2381 **Volta's Pile,** consisting of Zinc and Copper Plates, mounted on Mahogany Frame... ... ... 20 pairs £1 1 0
50 ,, 1 15 0

2382 **Wire,** Bent, rotating on an Axis in its own Plane ... 0 10 6
2383 ,, Rotating 0 10 6
2384 ,, Vibrating 0 2 6

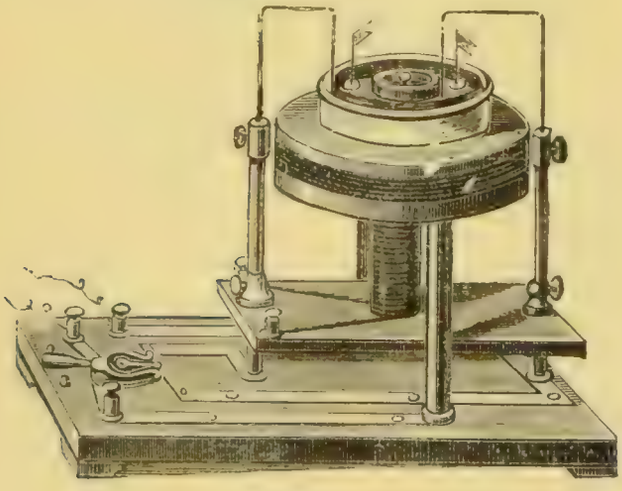


2385

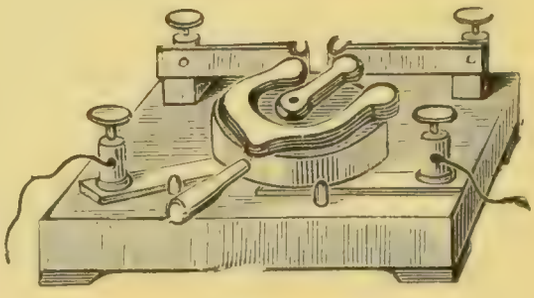


2386

2385 **Apparatus,** to illustrate the action of the Earth on a horizontal current £1 1 0
2386 „ „ „ on a vertical current 0 17 6

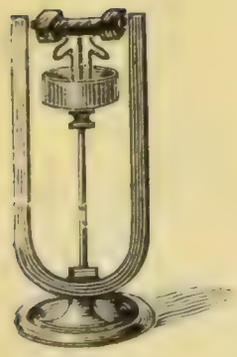


2387

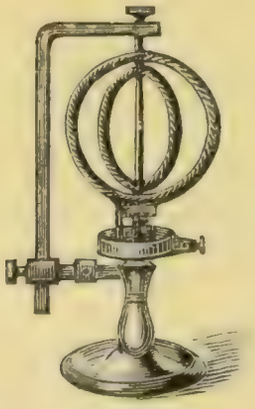


2388

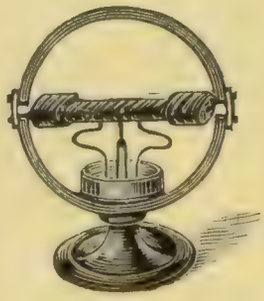
2387 **Apparatus,** to illustrate Electro-Magnetic rotation of Liquids, with Bertin's Commutator and Moveable Stage £3 5 0
2388 **Bertin's Commutator** 1 5 0



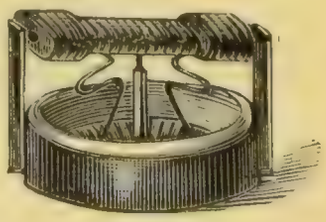
2389



2390

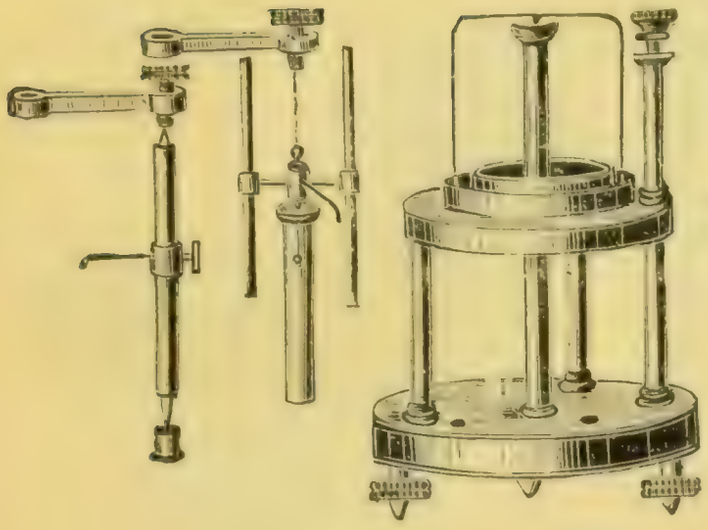


2391

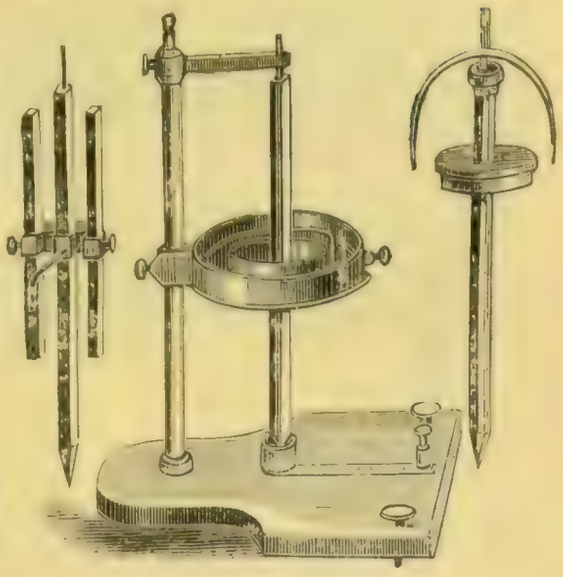


2392

2389 **Ritchie's Rotating Magnet** £0 14 0
2390 „ **Wires,** to show reversed Currents 1 0 0
2391 „ **Permanent and Electro Magnet** 0 14 0
2392 **Sturgeon's Mercury Break** ... each 5/6, 8/6 and 0 12 6



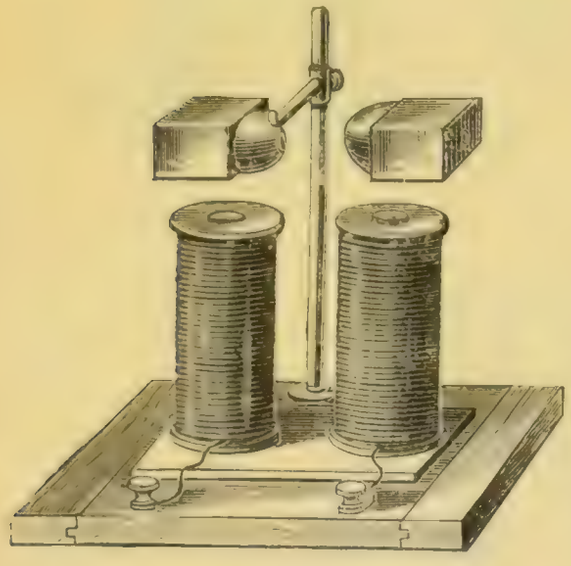
2392A



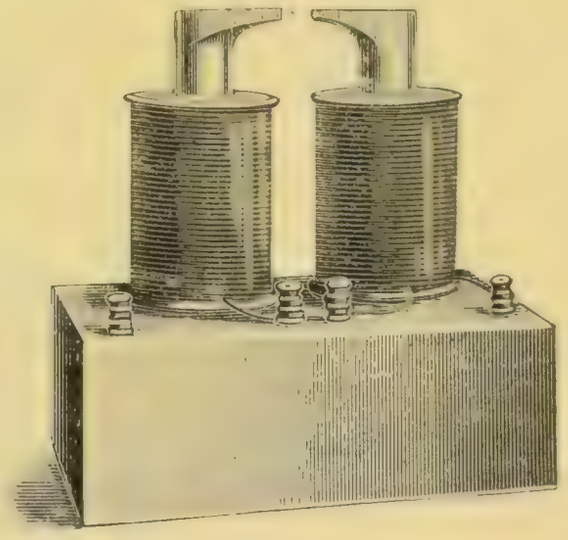
2393A

2392A **Apparatus,** to show rotation of a Magnet on its Axis ... £2 10 0

2393A „ Faraday's, to show rotation of Magnets by currents 2 12 0



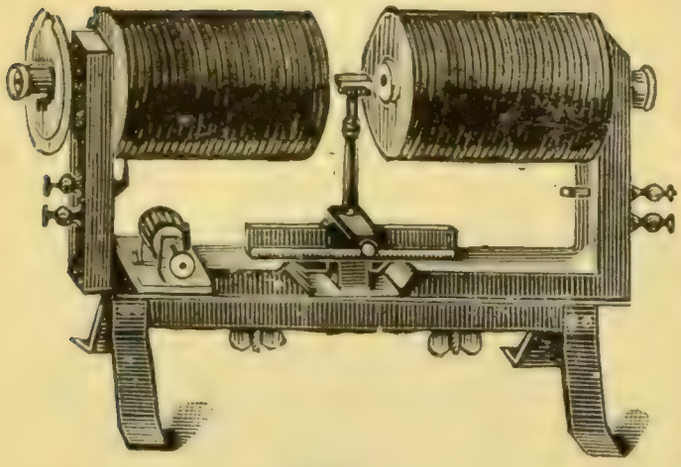
2394A



2394B

2394A **Dia-Magnetic Apparatus,** very powerful, for Lecture purposes, mounted on Polished Mahogany Base, with Armatures, having a Ring attached, Moveable Pole Pieces shaped and bored for experiments in Dia-Magnetism and Polarised Light, a Vertical Pillar at back forms a support from which the objects may be suspended, Soft Iron Cores 1½ in. diameter, with Coils wound on Moveable Brass Bobbins £7 7 0

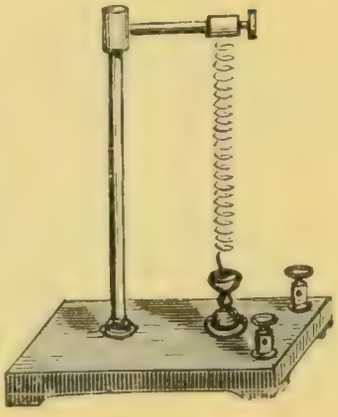
2394B **Dia-Magnetic Apparatus,** another form, provided with Pole Pieces, and mounted on Wooden Stand ... 6 6 0



2396



2397



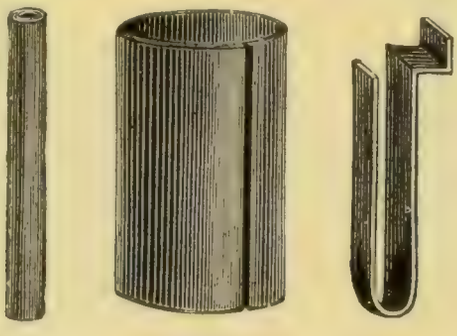
2400

2396 **Dia-Magnetic Apparatus,** best quality, with Coils, on Sliding Frame, Vernier, Commutator, Hollow Cylinders, Hollow and Solid Poles, Suspension Apparatus, &c. ... £21 0 0

2397 **Plantes' Secondary Cell,** charged by 2 Bunsen's Batteries or small Dynamo, experiments may be performed in Dia-Magnetism and Electric Light. The Battery will require re-charging after a few minutes, but will remain in action a sufficient length of time for the experiments; surface of Lead Plates about 125 square inches 0 13 6

(*Other Secondary Batteries, see page* 375.)

2400 **Copper Helix,** to show contraction 1 1 0



2402 2403 2404

2401 **Zinc Plates,** amalgamated, for Smee's Batteries—
5 × 2½ in. per pair £0 0 8

2402 ,, **Rod,** for Daniell's Batteries (screwed for Terminals)
4½ × 1 in. each 0 0 6
9 × 1 ,, ,, 0 1 0

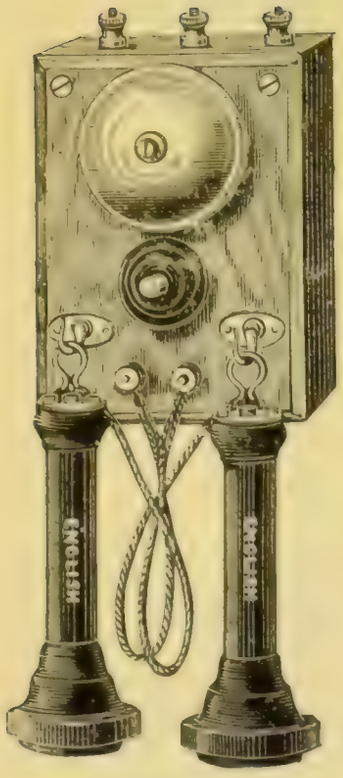
2403 ,, **Cylinder,** for Bunsen's Batteries 6 × 3 ,, ,, 0 1 6
7 × 3¾ ,, ,, 0 2 6

2404 ,, **Plate,** bent, for Grove's Batteries 5½ × 2½ ,, ,, 0 1 3
7 × 3⅞ ,, ,, 0 2 3

(*Other sizes made to order.*)

TELEPHONES.

(English Make.)



2404A



2404B

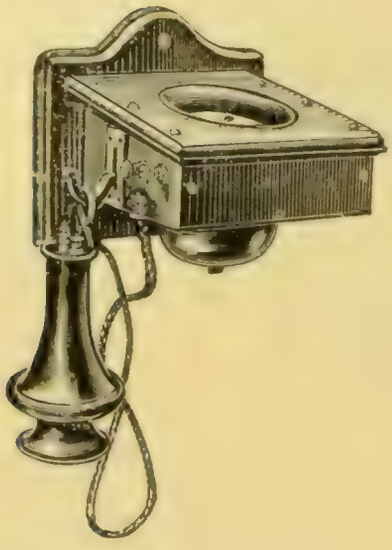


2404C

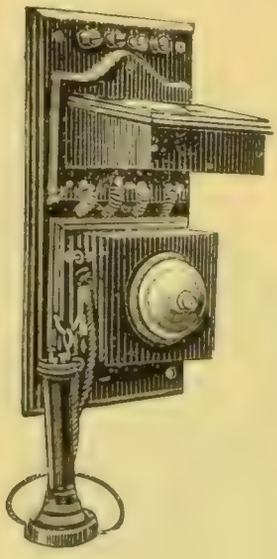
2404A **The Improved Bell Telephone,** though not so loud speaking as the various Carbon Transmitters, will be found very convenient for use on short lines, between offices and works, and for intercommunication in large buildings. They are very neat in appearance and are exceedingly well made, with Polished Teak Automatic Switch Board, and Ebonite Telephones—

	£	s.	d.
With 1 Suspended Transmitter and 1 Receiver, as shown ...	2	5	0
With only 1 Suspended Telephone, to be used as Transmitter and Receiver	1	10	0
Automatic Switch Board only	0	15	0
Receiver, in Polished Ebonite Case, with Terminals, Adjusting Screw, and Cord, complete, as shown in Fig. 2404B ...	0	15	0
The Britannic Single Pole Receiver, with Cord, in Wood Case, with Morocco Covered Magnet, as shown in Fig. 2404C ...	0	5	6

(By quoting the above parts separately our Customers can make up any set they choose.)



2405A



2405C

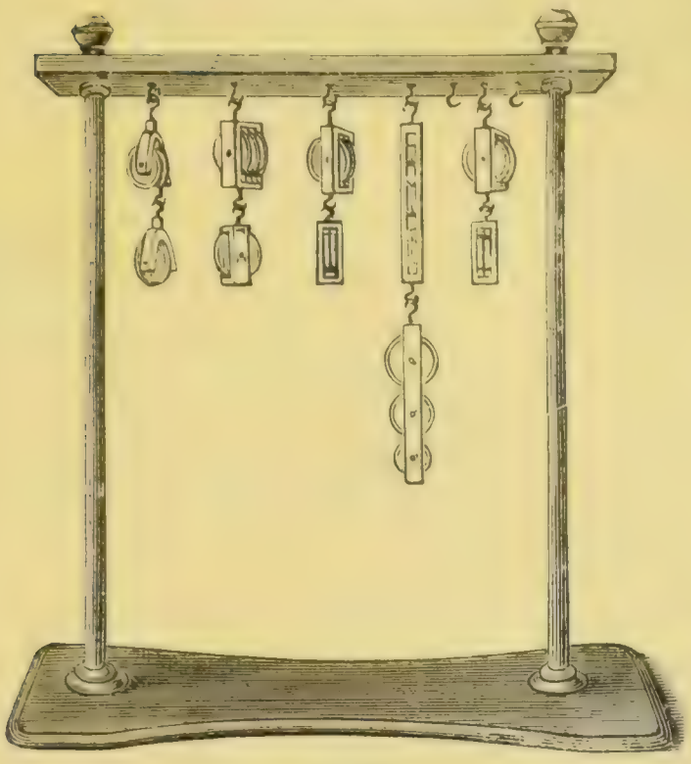
2405A **The Challenge Telephone** is the neatest and most complete Telephone ever offered to the public at a moderate price, comprising as it does a loud and distinct speaking Carbon Transmitter, with Induction Coil, and a thoroughly reliable Switch movement, contained in a handsome Polished Teak or Walnut Case with Moulded Edges, having underneath a fine toned Call Bell, and finished Brass Terminals for Line and Battery connections. A powerful and sensitive Double Pole Bell Receiver in an elegant Ebonite Case completes the Instrument—

With Single Receiver, as shown	£2	14	0
With 2 Receivers	3	6	0

2405C **The Thorough Telephone** is an absolutely reliable combination of a loud speaking multiple Carbon Transmitter of the Gower Bell type, with an extra powerful Double Pole Bell Receiver, and a specially strong Switch Box, mounted together on a Polished Teak Backboard, as shown in the illustration. The Transmitter requires no adjustment whatever, while the Receiver is provided with a Regulating Screw, so that nothing can go wrong with ordinary care. The materials and workmanship are throughout first-class—

With 1 Receiver, as shown	4	10	0
With 2 Receivers	5	10	0
If fitted with Magnet Call Bells, for long distance lines, extra	1	7	6

MECHANICS.

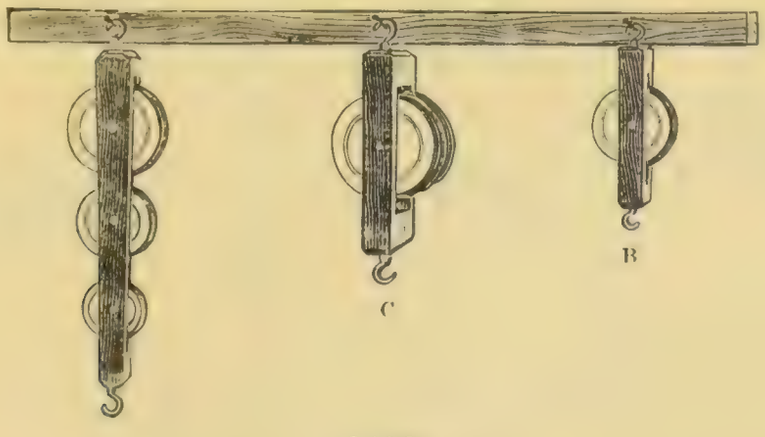


2406

2406 **System of Pulleys,** consisting of Japanned Iron Frame 3 ft. high, 2 ft. 6 in. wide, with Brass Pillars, and set of 10 Brass Pulleys and Cord £3 15 0

2406A **Pulley Frame,** Stained Blackwood, 3 ft. high, 2 ft. 6 in. wide, complete, with Hooks 0 12 6

2406A I „ „ Simple form, Stained Blackwood, 2 ft. 6 in. high, 2 ft. wide, complete, with Hooks ... 0 3 6

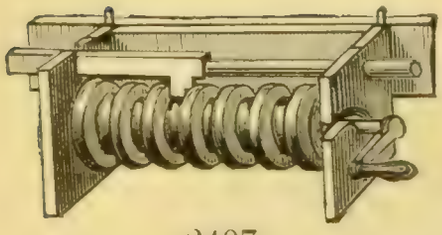


2406B, C, D

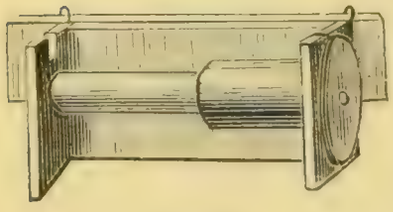
2406B **Pulleys,** Simple, Boxwood, 2½ in. diam., mounted in Polished Wood Frame ... ... set of 4 £0 5 0

2406C „ Compound, Boxwood, 3 sheaf ... set of 2 0 4 6

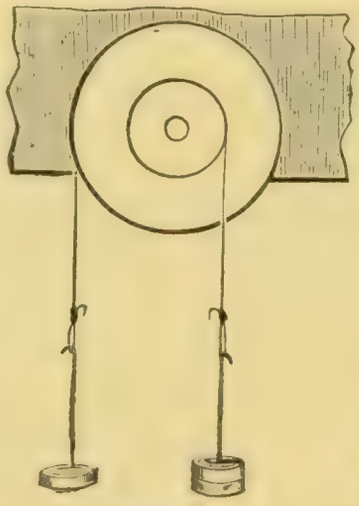
2406D „ „ „ long „ ... set of 2 0 4 6



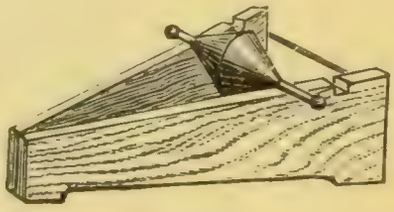
2407



2407



2408A



2409

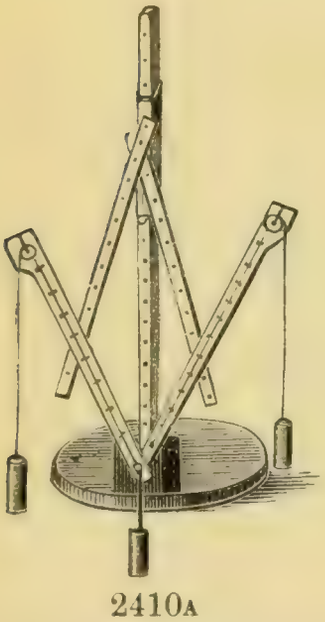
2407 **Wooden Screw,** Flat Thread, 9 in. × 3 in., Handle and Bracket, with Wheel and Axle adapted to the Bracket £0 15 6

2408 „ Polished Mahogany 1 5 0

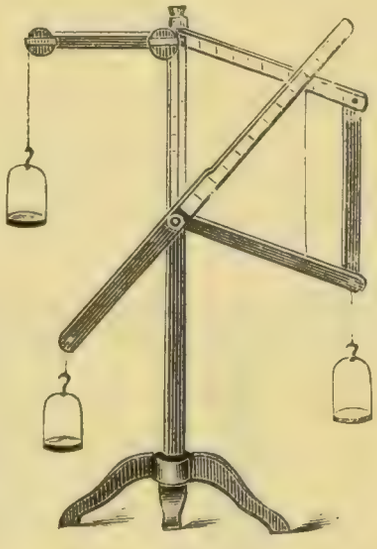
2408A **Wheel and Axle,** Simple form, Polished Stained Wood ... 0 2 0

2409 **Double Cone and Inclined Plane,** Black, Polished Whitewood Cone 0 8 0

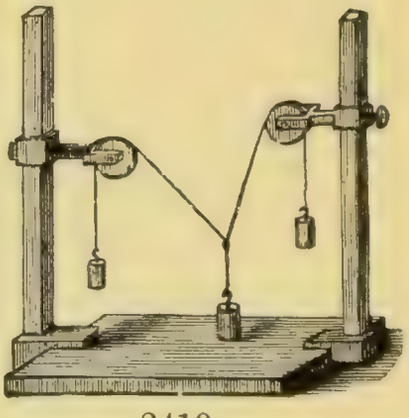
2410 **Double Cone,** Mahogany, Polished Whitewood Cone ... 0 12 6



2410A



2410B



2410C

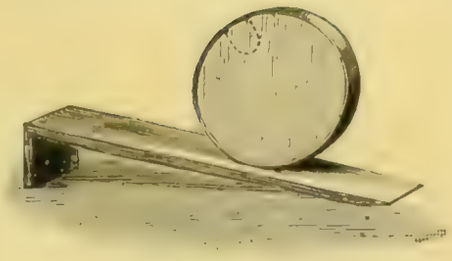
2410A **Frick's Apparatus,** to demonstrate the parallelogram of forces, the 4 Arms are bored at intervals, upright graduated Support, complete, with Pulleys and Weights ... £0 14 0

2410B **Bertram's Apparatus,** to demonstrate the parallelogram of forces, Arms graduated, mounted on Iron Tripod Stand, complete, with Scale Pan, Weights and Pulleys ... 1 10 0

2410C **Gravesand's Apparatus,** to demonstrate the parallelogram of forces, complete, with Pulleys and Weights ... 0 17 6



2411



2412A

2411 **Lever and Wedge-shaped Fulcrum,** 4 ft. × 2 ft. × $\frac{3}{8}$ in. thick, divided into 8 equal parts, with Brass Rings below for suspension, without Weights, Blackwood... ... £0 4 0

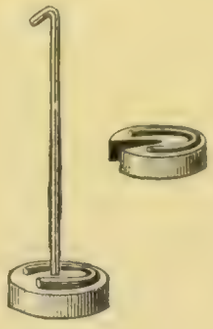
2412 „ Polished Mahogany 0 7 6

2412B „ 2 ft. long, Whitewood, graduated into inches ... 0 3 0

2412A **Cylinder and Inclined Plane,** diam. of Cylinder 6 in. ... 0 8 0



2413

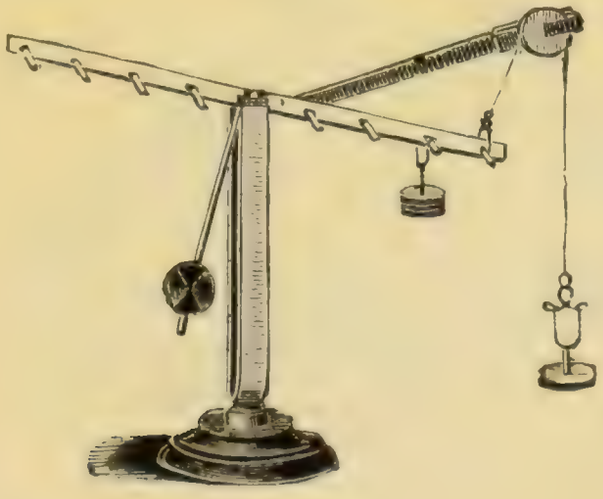


2415

2413 **Lever for Suspension,** 3 ft. × 2 in., for supporting Weights, divided into 20 equal parts, provided with Holes and Divisions, Blackwood £0 3 0

2414 „ Polished Mahogany 0 5 6

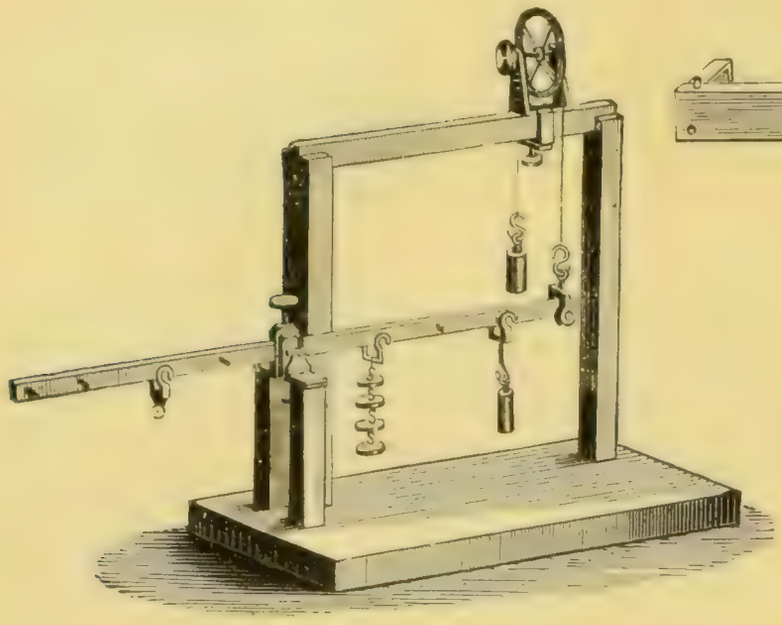
2415 **16 Zinc Weights,** 1 to $\frac{1}{10}$th lb., for use with above ... 0 7 6



2415A

2415A **Bertram's Lever,** Polished Brass, complete with Weights, mounted on Iron Stand £1 12 6

2415B **Frick's Lever,** Wood, without Weights 0 17 0



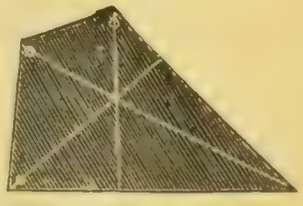
2415c



2416



2417A

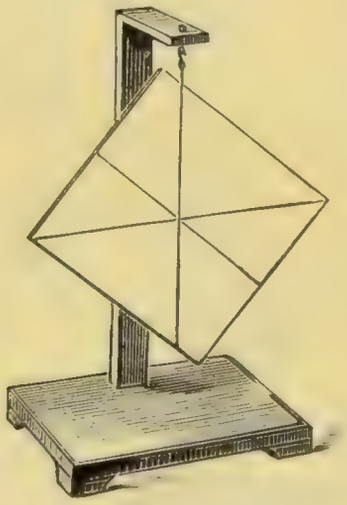


2418

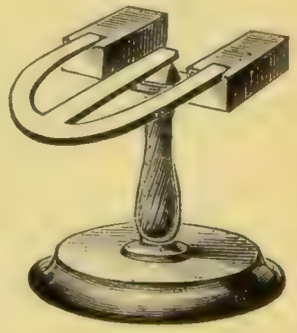
2415c	**Frick's Lever,** Polished Brass, complete, with 12 Weights ...				£3	3	0
2416	**Rail,** to attach to School Blackboard, Blackwood, for suspending Models, complete, with Hooks and Brackets ...				0	4	3
2417	„ Mahogany				0	6	0
2417A	**Scale Pans,** for Levers, &c.				0	0	6
	Pins and Hooks			per doz.	0	1	0
	Cord			per pkt.	0	1	0
2418	**Iron Irregular Plate** (marked), with String, for showing how Centre of Gravity may be found				0	1	6
2418A	**Irregular Board,** with Cord				0	1	0



2418B

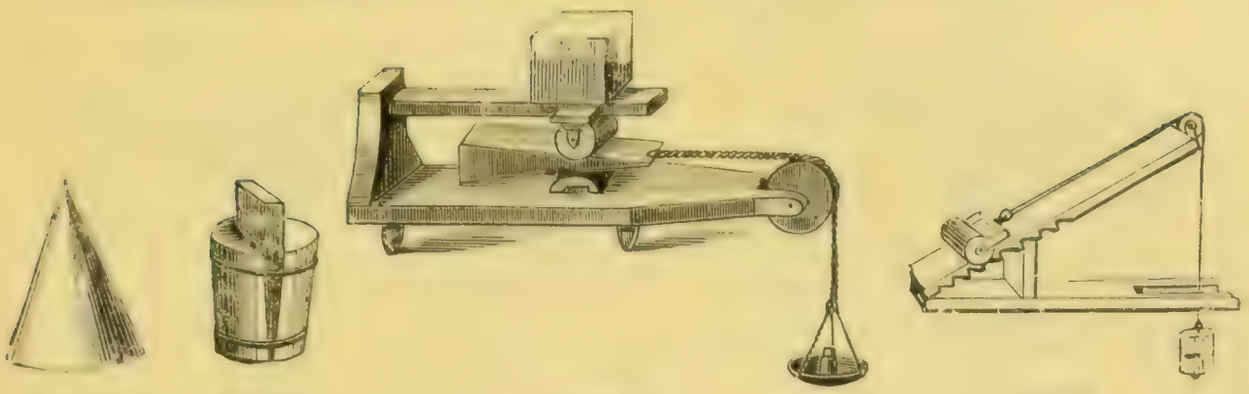


2418C



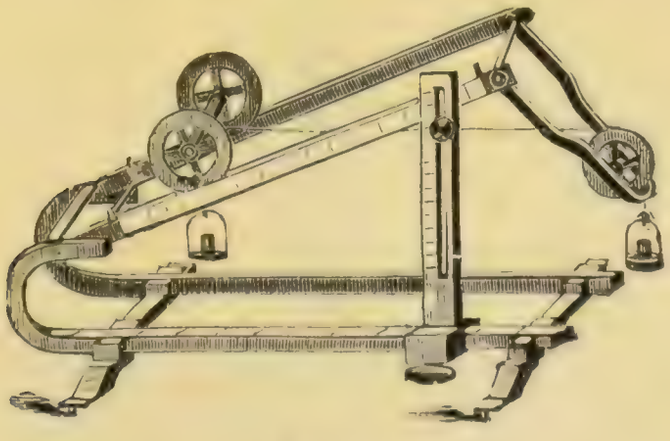
2418D

2418B	**Centre of Gravity Apparatus**				£0	9	0
2418C	„ another form, with 4 Figures and Stand, complete ...				1	0	0
2418D	„ Horseshoe form, on Stand				0	3	6



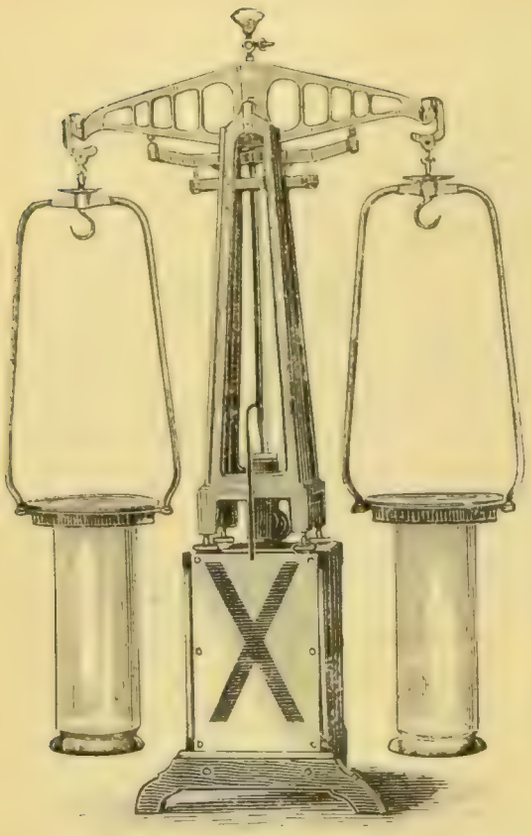
2419 2422 2423A 2421

2419	**Cone,** for showing Equilibrium, 5 in. high, 4 in. base, Polished Blackwood	£0	2 6
2420	,, Whitewood ... ... plain 1/6, polished	0	2 6
2421	,, Polished Mahogany	0	3 6
2421A	,, Dissected, Whitewood, showing Hyperbola, Parabola, and Ellipse	0	12 6
2422	**Wedge and Split Block,** bound with Caoutchouc Bands, Wedge 6 in. × 3½ in., Block 7 in. × 4 in., Blackwood ...	0	3 0
2423	,, Mahogany	0	6 0
2423A	**Wedge Apparatus,** Polished Mahogany, with Brass Rollers and Scale Pan	1	1 0
2424	**Inclined Plane,** with Brass Roller and Pulley, Scale Pan and 1 lb. Weight, Whitewood	0	9 6
	,, Polished Blackwood	0	11 6
2425	,, Polished Mahogany	0	15 0

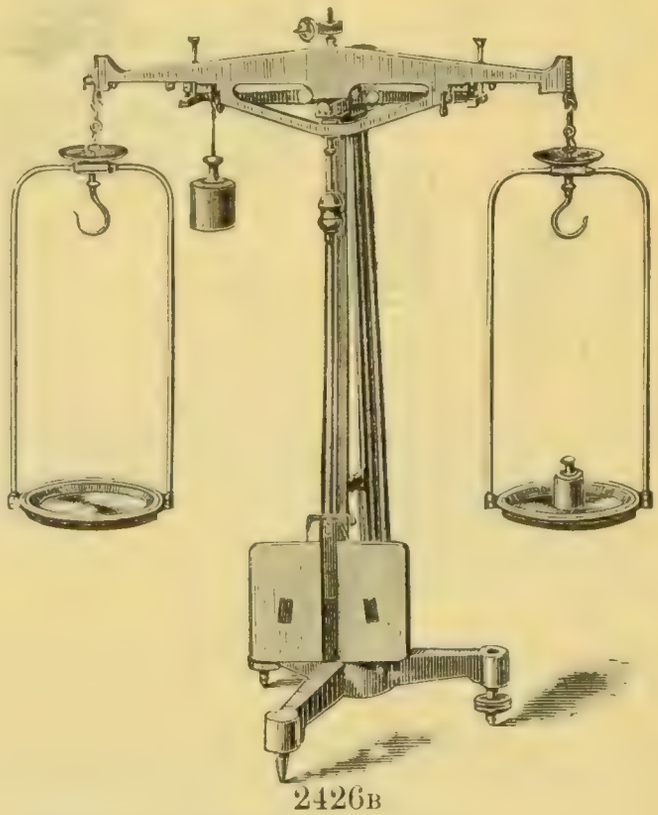


2425A

2425A **Inclined Plane,** Bertram's, made entirely of Iron and Brass, graduated to measure the length of the Plane of the base as well as height, complete, with Roller, Pulley, and Scale Pans £3 7 6



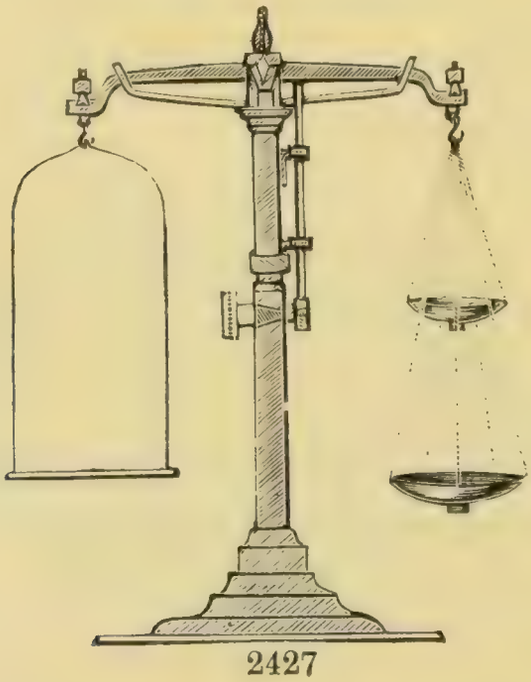
2426A



2426B

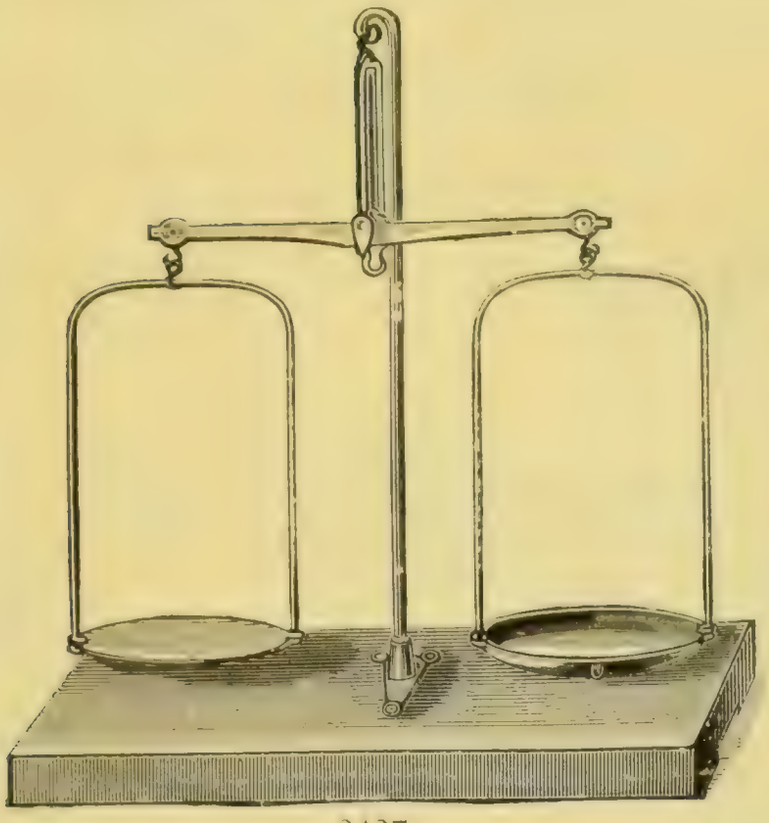
2426A **Balance,** for Chemical and Physical experimental work, to carry 5 kilogrammes in each Pan, sensible to 1 centigramme, suitable for Lecture use, complete, with 2 adjusted Glass Cylinders, 2 Plate Glass Discs, and 2 Magnets £13 10 0

2426B „ another form 10 10 0



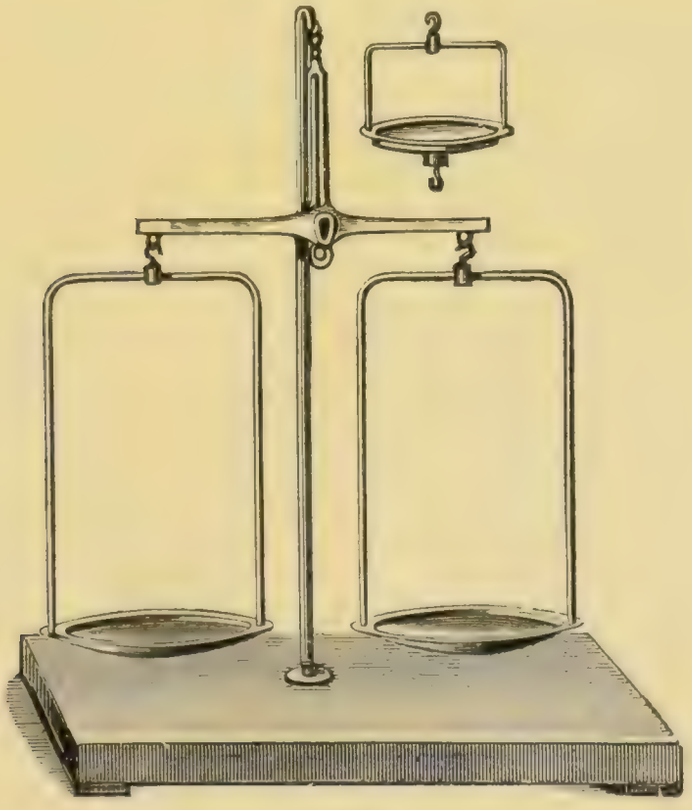
2427

2427 **Balance,** Townson & Mercer's, Brass, for Physical Experiments and Lecture, on Polished Brass Pillar, to carry 2 lbs. in each Pan, and sensible to 10 milligrammes, with Pan for Specific Gravity. Height of Pillar 21 in., diameter of Pan 5 in., length of Beam 16 in. £2 10 0



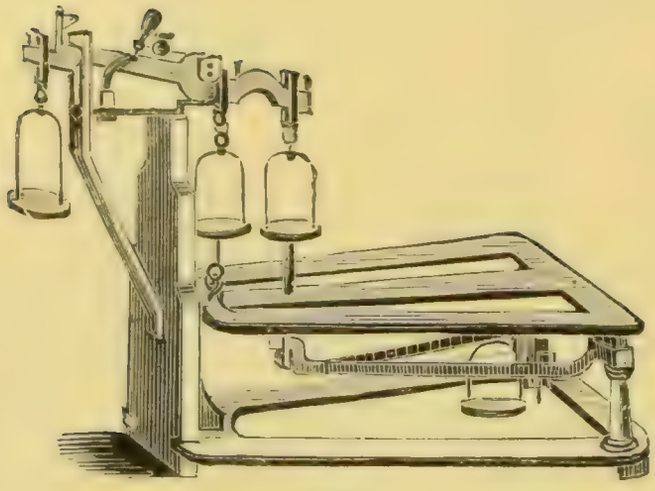
2427A

2427A **Balance,** for Physical Experiments, Bronzed Iron, to carry 1,000 grammes, length of Beam about 12 in., Brass Pans 6 in. diameter, on Polished Wood Stand £0 10 6

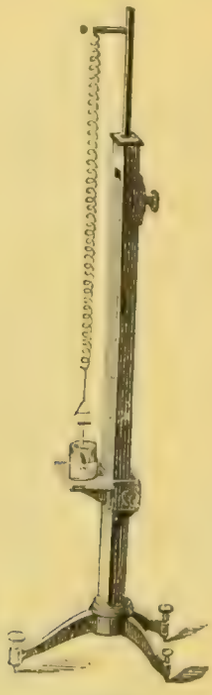


2427B

2427B **Balance,** Brass, to carry 500 grammes, length of Beam 12 in., Scale Pans 5½ in. diameter, mounted on Polished Wood Stand £1 1 0



2427c

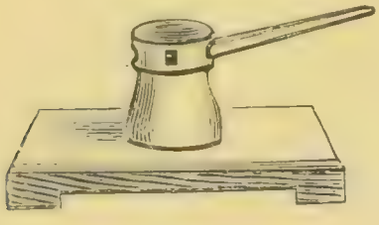


2427D

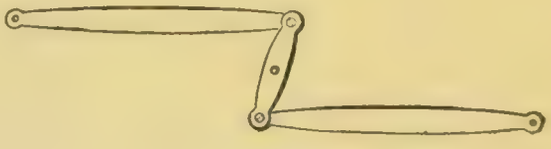
2427c **Model of Weighbridge,** which can be used as an ordinary Balance, to weigh up to 10 kilogrammes £2 0 0

2427D **Jolly's Specific Gravity Spring Balance,** mounted on Tripod Stand, with Levelling Screws 2 5 0

2428 **Set of Weights,** Iron, from 1 lb. to $\frac{1}{4}$ oz. Avoirdupois, $\frac{1}{4}$ oz. and $\frac{1}{2}$ oz. in Brass 0 1 6



2429

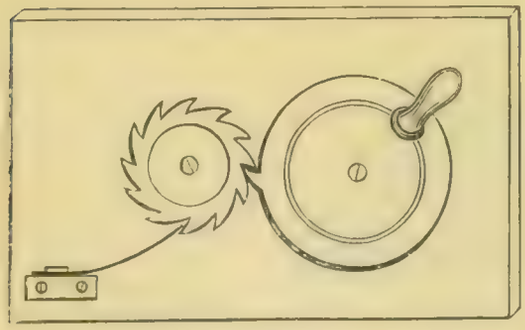


2429B

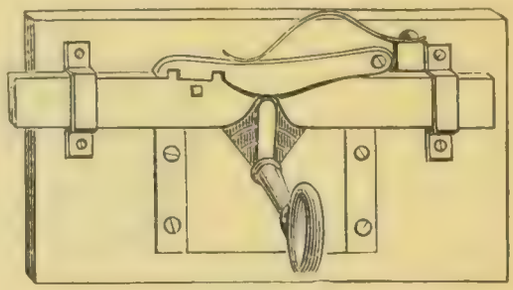
2429 **Capstan,** on Mahogany Frame, with Boxwood Screw and Handle £0 10 6

2429A ,, Smaller, Black Base, Whitewood Screw ... 0 7 6

2429B **Model,** to illustrate Parallel Motion 0 2 6



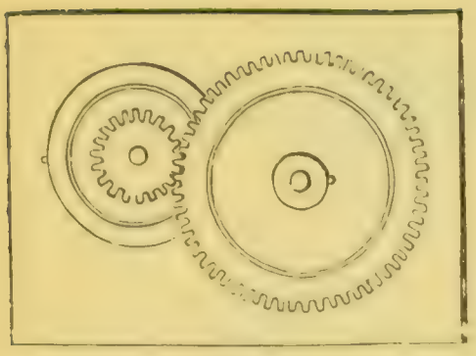
2429c



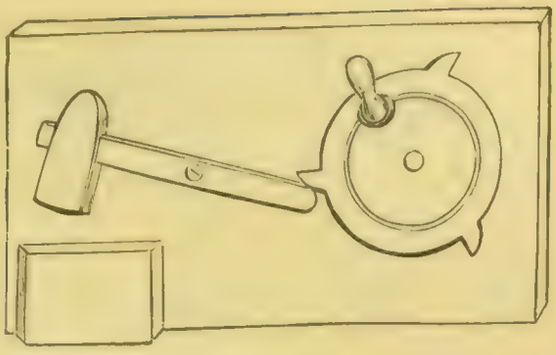
2429D

2429c **Model,** to illustrate Intermittent Motion £0 7 0

2429D ,, of Lock, mounted on Board 0 7 6

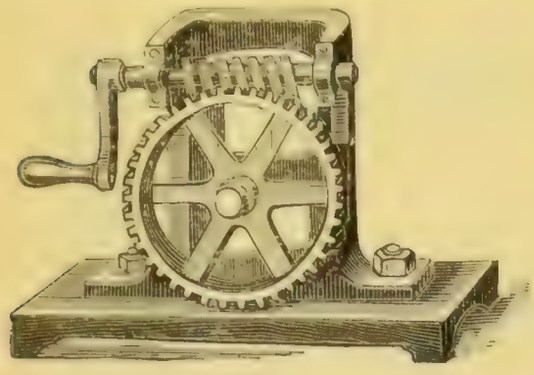


2429E

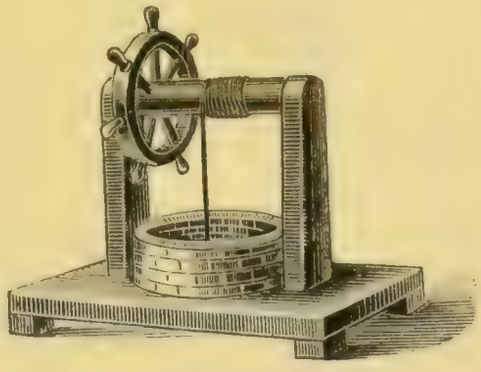


2429F

2429E **Train of Wheels,** Small and Large Toothed Wheels, mounted on Board £0 12 0
2429F **Forge and Tilt Hammer,** with Anvil 0 7 6



2429G

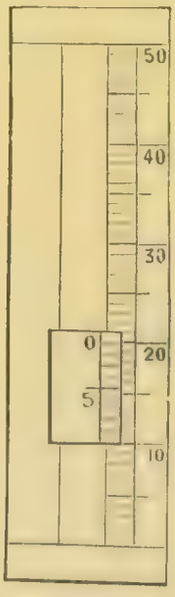


2429H

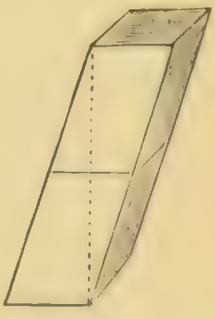
2429G **Model** of Endless Screw, Iron £1 17 0
2429H ,, of Windlass ... ... 8/6 and 0 12 6
2429I ,, of Pile Driver ... ... 14/6 and 0 17 6



2429K

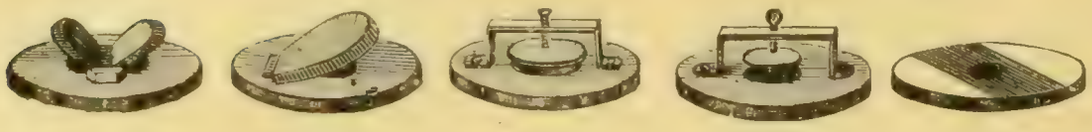


2429L



2430

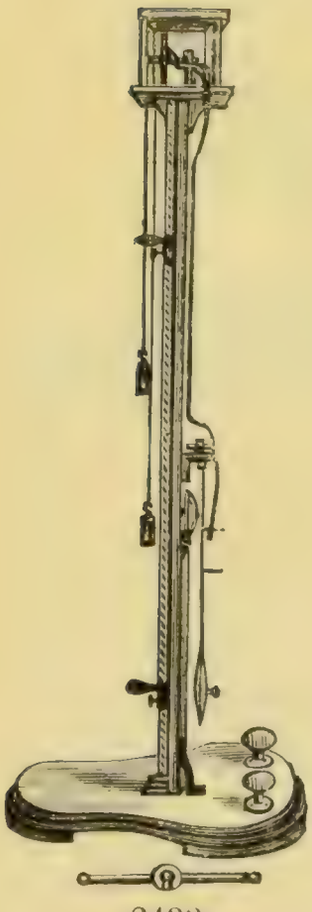
2429K **Model** of Vernier, circular form £0 9 0
2429L ,, ,, 2 ft. long 0 7 6
2430 **Parallelopipeds,** or Centre of Gravity, each Block 9 in. × 4 in. × 2 in., Blackwood 0 1 7
2431 ,, Polished Mahogany 0 3 0



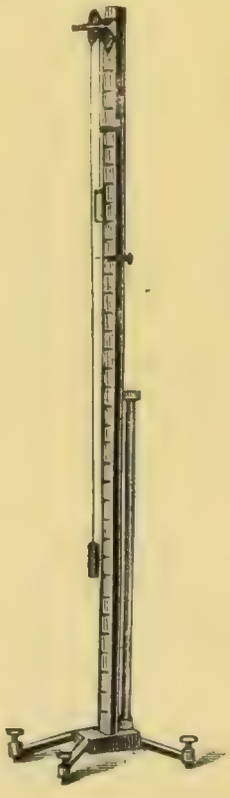
A B C D E

2432

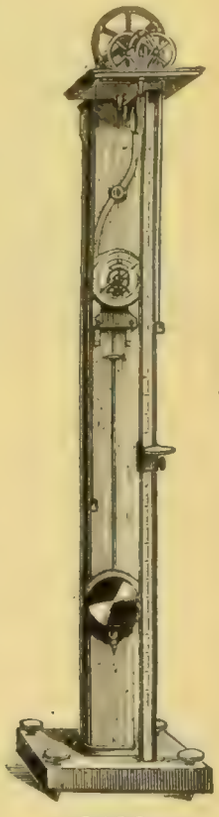
2432 **Wood Models of Valves,** diameter 5 in. A, Butterfly Valve. B, Bellows Valve. C, Round Spring Valve. D, Conical Valve. E, Oil Silk Valve. Price for the complete set ... £0 8 6



2433



2433A



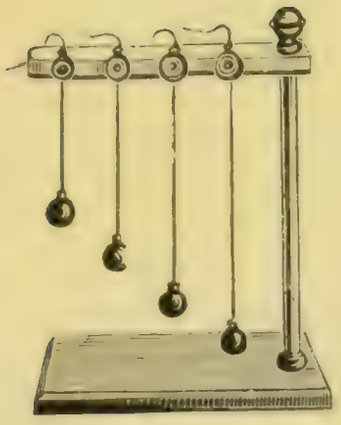
2433C

2433 **Attwood's Machine,** for illustrating the law of falling bodies, 8 ft. high, with centimetre graduations, large Brass Pendulum, 2 Brass Buckets, 3 Brass Weights, &c., on solid Mahogany Frame and Base, with Levelling Screws £12 0 0

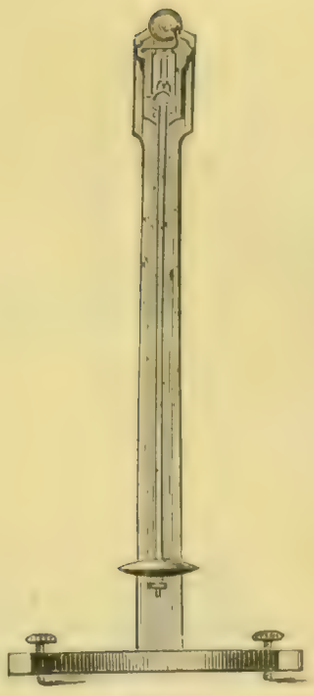
2433A ,, cheap form, graduated Wooden Scale, mounted on strong Iron Stand, with Levelling Screws 4 4 0

2433B ,, with Seconds Pendulum 6 0 0

2433C ,, best construction, with Friction Wheels and Automatic Arrangement for releasing Weights 18 0 0



2434

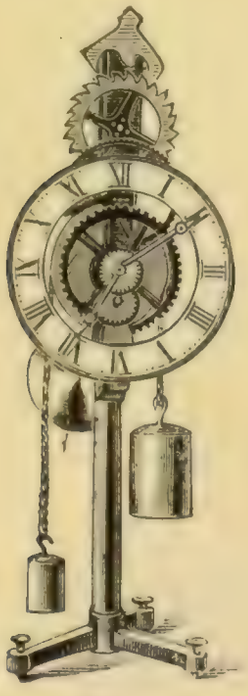


2434B

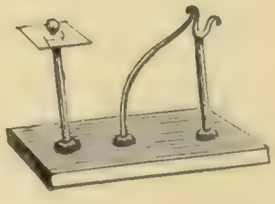
2434 **Apparatus,** for illustrating the laws of the Pendulum, on Japanned Iron Stand, with Brass Supports, the upper Rail with Brass Screws, through which the Cords with Brass Balls may be adjusted £0 14 0

2434A **Seconds Pendulum,** simple form, with Holder, for fixing to Wall 1 5 0

2434B „ giving distinct beats every second, mounted on Iron Stand, with Levelling Screws 2 12 6



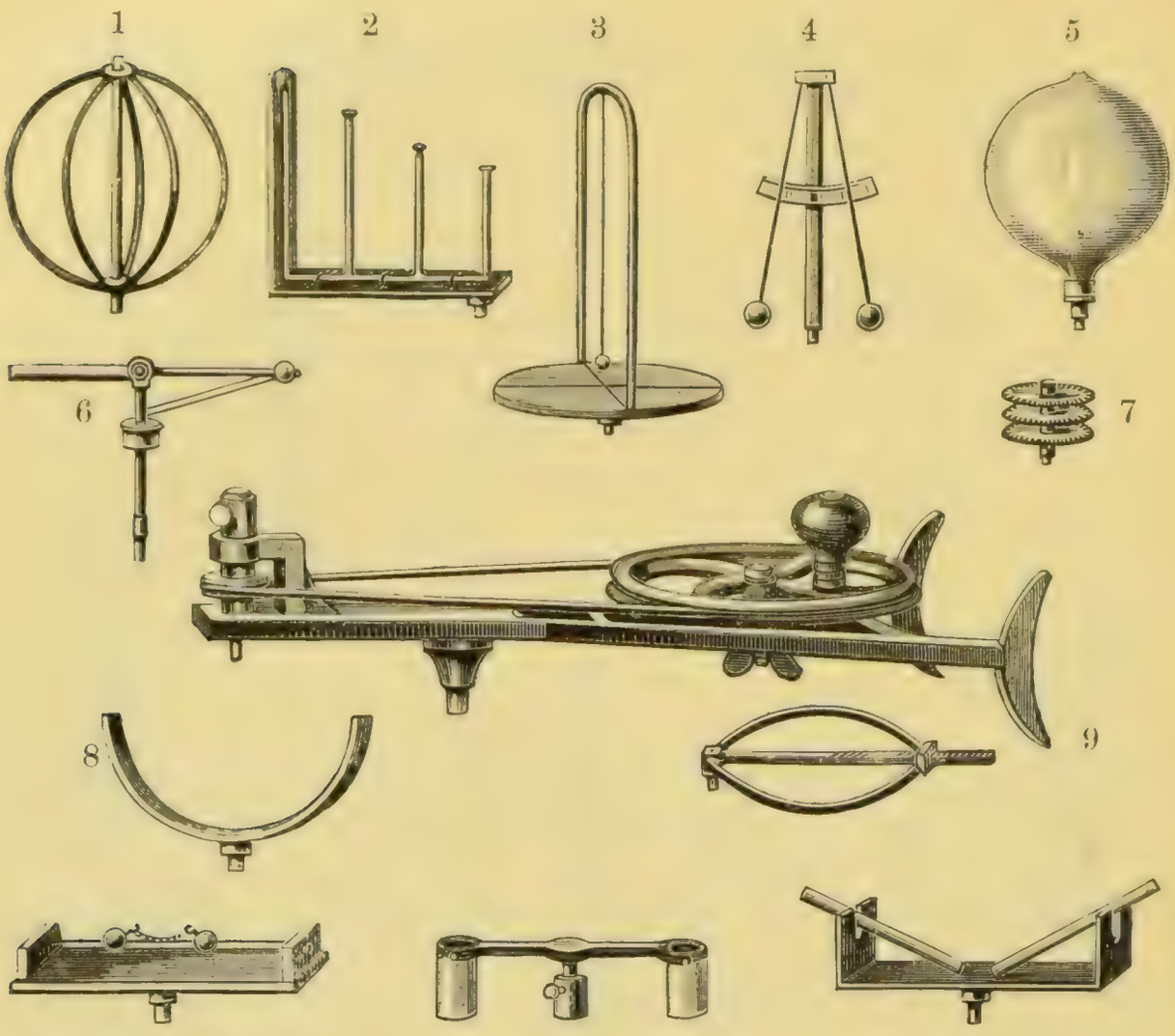
2434C



2435

2434C **Working Model of Clock** £1 12 0

2435 **Inertia Apparatus,** on Mahogany Stand, with Brass Supports 0 5 0



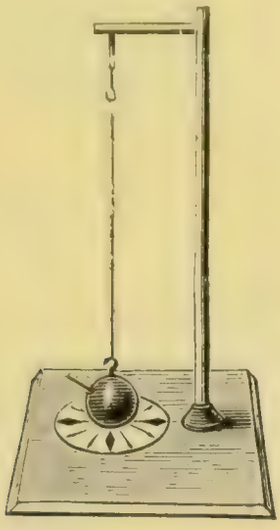
2435A

2435A **Whirling Table,** on Iron Feet, arranged to work vertically or horizontally, with the following Experiments:—

1. Brass Elastic Rings
2. Level Apparatus.
3. Foucault's Pendulum.
4. Governor.
5. Glass Globe.
6. Ball, with Weight attached.
7. Savart's Toothed Wheel.
8. Semicircular Ring, with Two Balls.
9. Centrifugal Ring.
10. 2 Brass Balls, sliding on Rod.
11. Bertram's Precipitating Apparatus.
12. 2 Tubes, mounted on Supports.

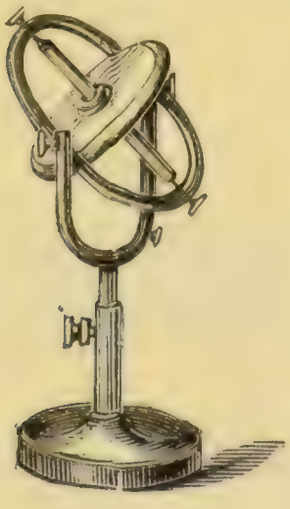
Price, complete £6 0 0

2436 **Whirling Table,** same Table as above, with the following Experiments to illustrate the laws of Central Force:— Glass Globe for Water, 3 in. diameter, Glass Tube on Metal Stand, Brass Elastic Rings, Centrifugal Regulator, Two Balls on Wire, Newton's Disc, Brass Tube and Board for showing Tyndall's Heat Experiment. All the above mounted with Brass Mounts to fit on Axle Pulley, complete set £4 0 0



2438

2438 **Torsion Apparatus,** consisting of Metal Ball, with Index, and Graduated Circle, with Support on Mahogany Stand, to illustrate the laws of Torsion £0 17 6



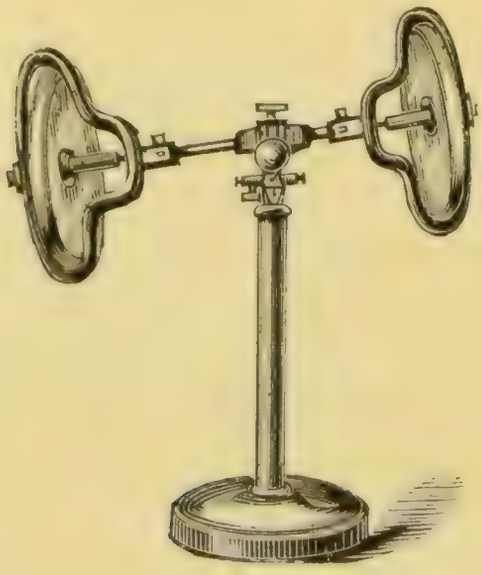
2439



2439A

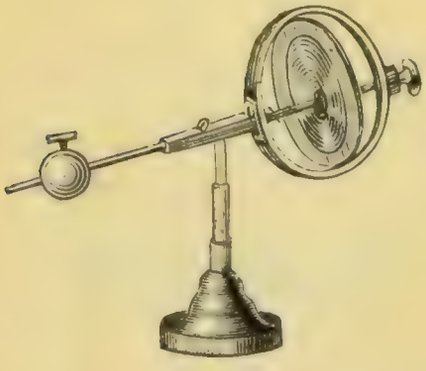
2439 **Gyroscope,** best make, Polished Gun Metal, with Weights, &c., to illustrate several Inertia Experiments... £1 15 0

2439A ,, simple form, mounted on Bronze Iron Foot ... 1 1 0

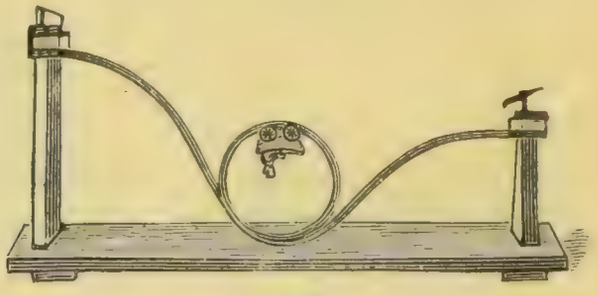


2441

2441 **Gyroscope,** best Polished Gun Metal, double £3 10 0



2441A



2442

2441A **Fessel's Rotation Apparatus,** with Sliding Weight, mounted on Bronze Iron Foot £1 5 0

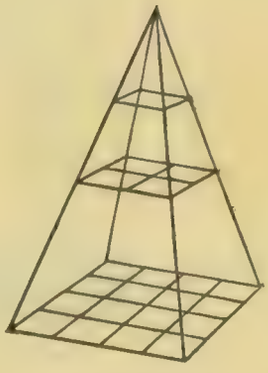
2442 **Centrifugal Railway,** with Carriage and Figure, on Mahogany Stand 0 18 0



2443



2443A

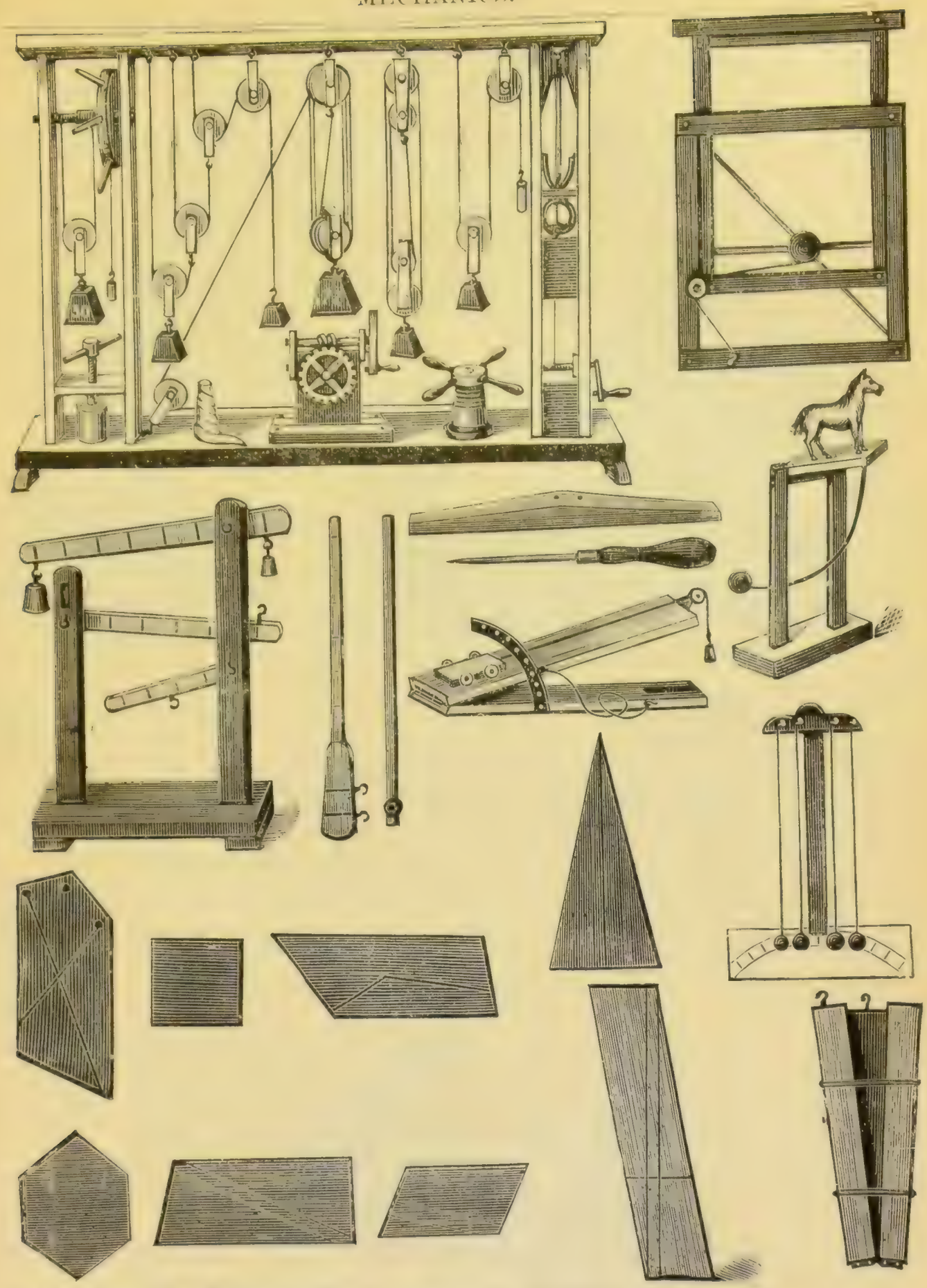


2443B

2443 **Chinese Toy,** to show Equilibrium £0 2 0

2443A **Equilibrist,** to show Equilibrium 0 2 0

2443B **Wire Pyramid,** to show law of Inverse Squares... ... 0 2 6



2444 **Set of Mechanical Powers,** in Polished Mahogany, consisting of Sets of Pulleys and Weights, Wheel and Compound Axle, Crank and Pile Driver, Capstan, Endless Screw and Wheel, Screw Press and Screws fitted on Mahogany Frame; also Models illustrating Centre of Gravity, Sliding Pulley Frame, Collision Balls and Stand, Parallelopiped, Lever Stand showing three systems, Wedge and Block, Inclined Plane, &c. Complete in Black Wood Case, with Lock and Key £5 0 0

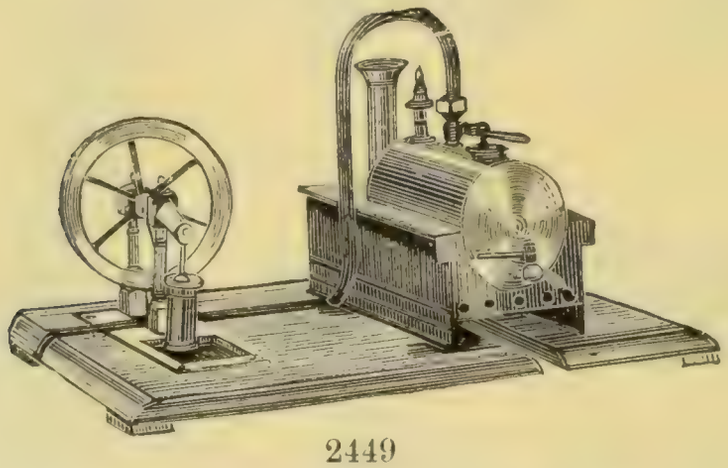
2444A ,, larger size, as recommended by the Science and Art Department 9 10 0

2445 **Gentleman's Oak Tool Chest,** No. 2, with Lock and Key, contains Hand Saw, Hatchet, Hammer, Mallet, Rule, Pincers, 3 Gimlets, 3 Bradawls, 2 Chisels, Gouge, 3 Files, Oil Stone, Marking Awl, Punch, Turnscrew, Spokeshave, Square, Claw Wrench, Plyers, Compasses, Nails and Screws £1 15 0

2446 **Chest,** No. 3, contains Hand Saw, Hatchet, Hammer, Mallet, Rule, Pincers, 3 Gimlets, 3 Bradawls, 3 Chisels, 2 Gouges, 3 Files, Oil Stone, Marking Awl, Punch, 2 Turnscrews, Spokeshave, Square, Claw Wrench, Plyers, Compasses, Lock Saw, Plane, Nails and Screws 2 5 0

2447 **The Norfolk Tool Chest,** No. 4, with Drawer, contains Hatchet, Hand Saw, Hammer, Mallet, Rule, Pincers, 4 Gimlets, 4 Bradawls, 4 Chisels, 2 Gouges, 3 Files, Oil Stone, Marking Awls, Punch, 2 Turnscrews, Spokeshave, Square, Claw Wrench, Plyers, Compasses, Lock Saw, Plane, Marking Gauge, Glue Pot and Brush, Nails and Screws 2 15 0

2448 **Chest,** No. 5, with Drawer, contains Hand Saw, Axe, Hammer, Mallet, Rule, Pincers, 5 Gimlets, 5 Bradawls, 5 Chisels, 3 Gouges, 4 Files, Oil Stone, Marking Awl, Punch, 2 Turnscrews, Spokeshave, Square, Claw Wrench, Plyers, Compasses, Lock Saw, Plane and Bevel, Marking Gauge, Glue Pot and Brush, Drawing Knife, Cutting Punch, Scraper, Nails and Screws 3 10 0

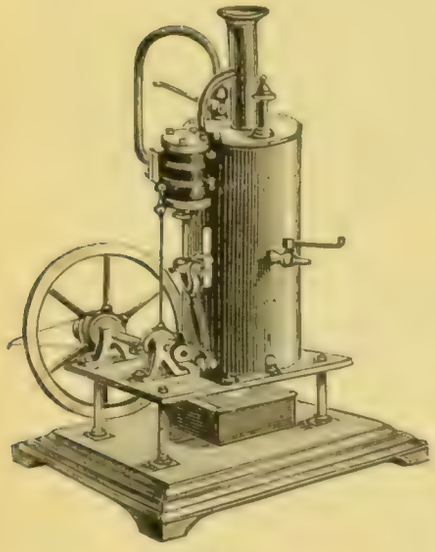


2449

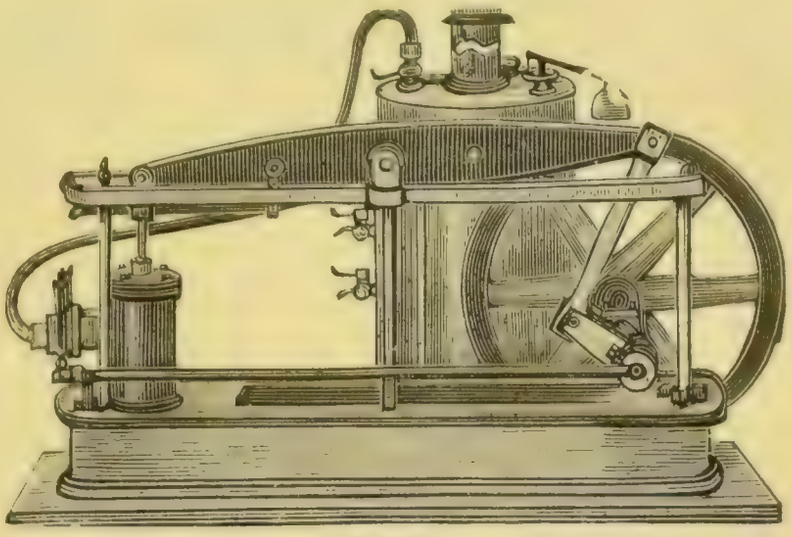
2449 **Vertical Engine,** highly finished, with Brass Mounts, separate Brass Boiler, fitted with Spring Safety Valve, Steam and Gauge Taps, &c., on Polished Mahogany Board £1 0 0

2450 **Vertical Engine,** Brass Vertical Boiler, double action Oscillating Cylinder, Taps, Valves, &c. 1 10 0

2451 **Horizontal Engine,** with Slide Valve, Cylinder $\frac{5}{8}$ in. bore, 1 in. stroke, Copper Boiler 5 × 2½ in., Lever Safety Valve, 2 Water Taps, &c., with a reversing motion, on Mahogany Stand £3 0 0



2451A



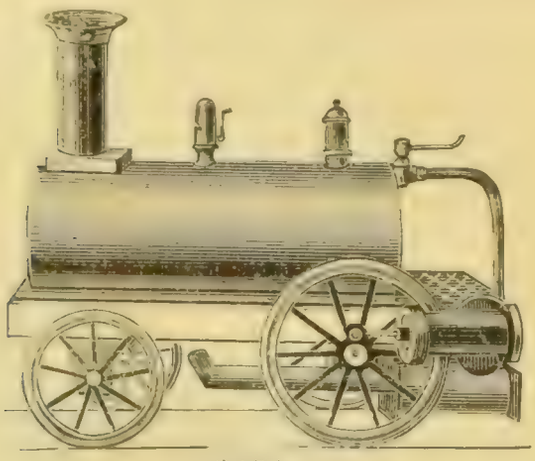
2453

2451A **Vertical Engine,** Brass Boiler, 2½ in., on Brass Bed Plate, double action Slide Valve, Cylinder ½ in. bore, 1 in. stroke, reversing action, Steam Tap, Gauge Tap, Safety Valve, and Lamp, mounted on Mahogany Stand with 4 Brass Pillars £1 15 0

2452 **Pump Engine,** Oscillating Cylinder, 2 Brass Supports to Wheel, Glass Cylinder, Suction Tube, Water Receiver, &c., raised Brass Horizontal Boiler, Water and Steam Taps, &c., mounted on Mahogany Stand 2 5 0

2453 **Superior Beam Engine,** with Slide Valve, Cylinder ¾ in. bore, 1 in. stroke, with Governors, Throttle Valve, parallel motion, Fly Wheel 5¼ in. diam., Beam mounted on 4 Brass Pillars, Bed Plate on imitation Brick Stand, Copper Boiler 4½ in. diam., 6 in. high, Lever Safety Valve, Steam Tap, &c., on Polished Mahogany Stand ... 5 5 0

2454 **Large Beam Engine,** extra finish, Gun Metal Cylinder 1 in. bore, 2 in. stroke, Gun Metal Eccentric and parallel motion, Beam mounted on Moulded Frame, supported by 5 bright Iron Pillars, Iron Fly Wheel 7 in. diam., Bed Plate polished bright Iron, on Iron Tank, Boiler outer Copper Casing riveted, inner Boiler Copper 7 × 7 in. brazed, Safety Valves, &c., mounted on Polished Mahogany Stand 9 10 0



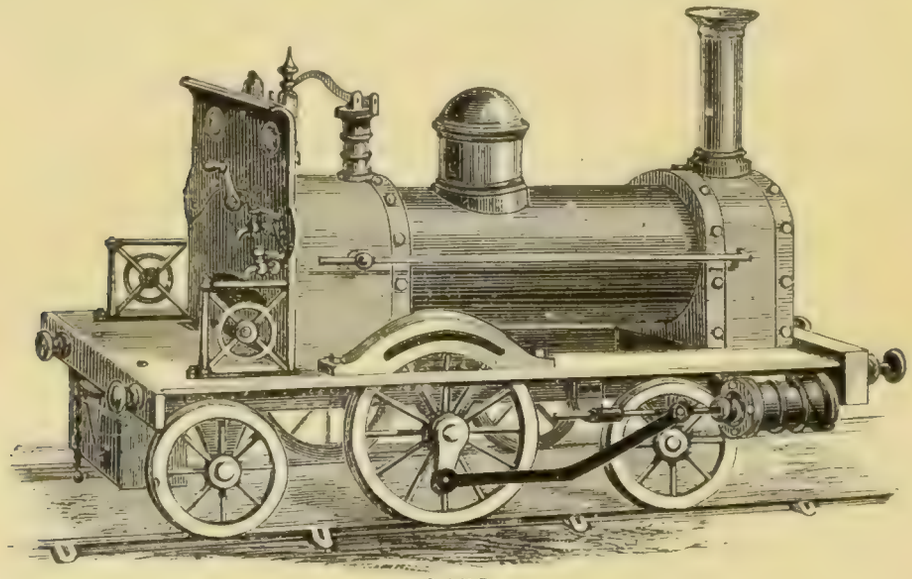
2454A

2454A **Locomotive,** Brass, length 7¾ in., running on 4 Wheels, driven by 2 Cylinders 4½×2 in., fitted with Safety Valve, Stopcock, Whistle, and Gauge Tap, mounted on Brass Chequered Plate, and Wooden Buffer Beam £0 18 6

2455 **Locomotive,** Brass, Boiler 6 × 2⅛ in., Gun Metal Dome, Starting Lever, Safety Valve, Whistle and Bibcock, running on 6 Wheels, driven by 2 Turned Cast Cylinders 1½ in. stroke, placed in front of Engine, mounted on Brass Foundation Plate, with 4 Buffers, complete with Lamp 1 17 6

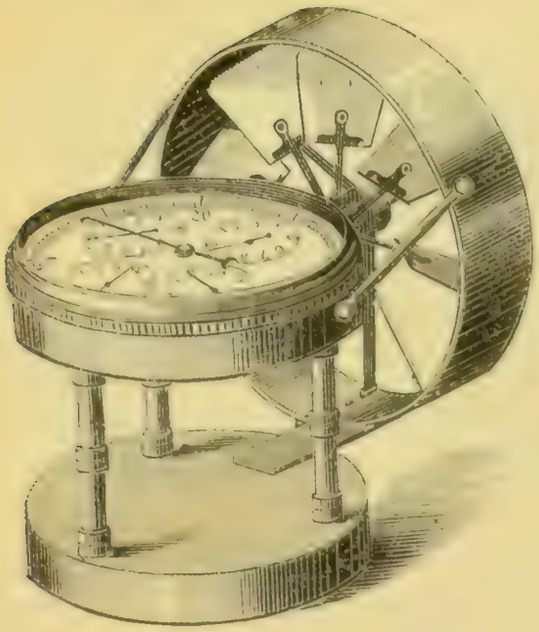
2455A Same as above, fitted with 2 double action Slide Valve Cylinders, reversing action by loose Eccentrics ... 2 10 0

2458 **Brass Locomotive Engine,** with Tender, length 14 in., Brass Boiler 9×2½ in., running on 6 Wheels, large size Driving Wheels 3½ in. diam., 2 Slide Valve Cylinders 1¼×⅝ in., fitted with Guide Bars, Connecting Rods, Eccentrics, &c., 2 Domes, Safety Valve, Whistle, 2 Bibcocks, Weather Board, improved Starting Lever with Stops "Off" and "On," Hand Rails, &c., fitted with 4 Buffers, Buffer Beam, complete with Lamp ... 4 10 0

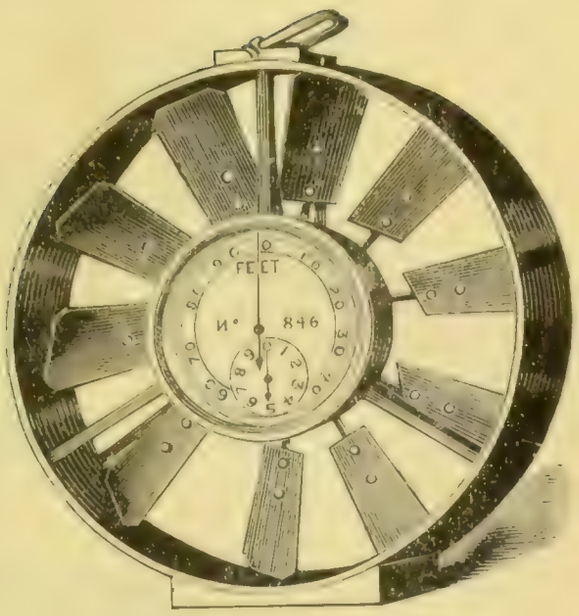


2459

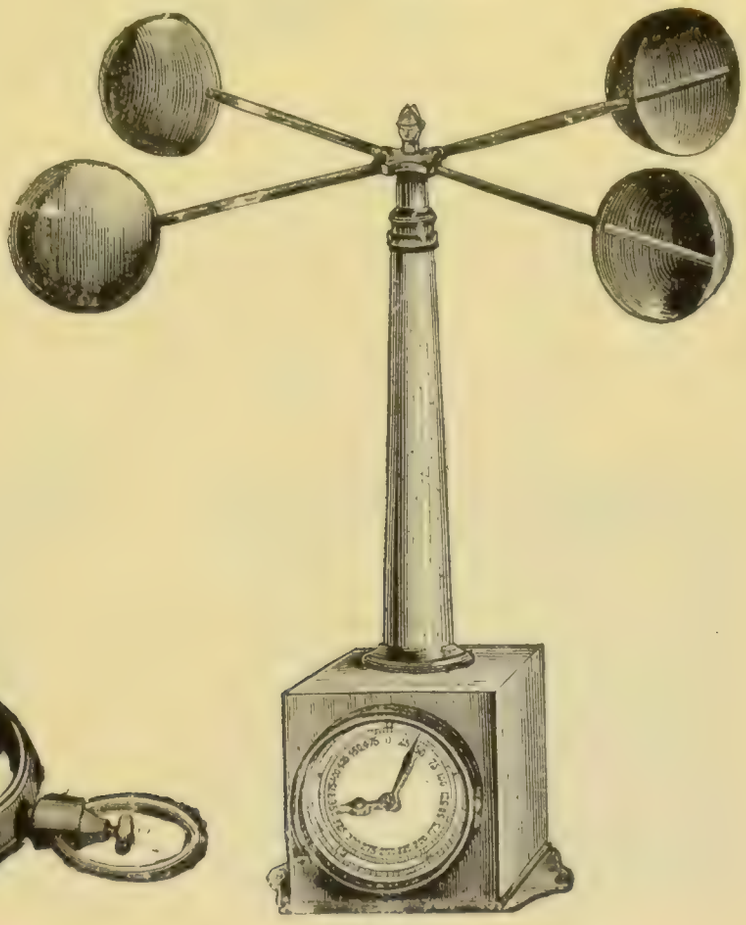
2459 **Superior Slide Valve Locomotive Engine,** on 6 Wheels, Polished Brass Boiler 10×3 in., Fire and Smoke Boxes, Steam Dome, Spring Lever Safety Valve, Whistle, Starting Lever, Gauge Taps, &c., to run backwards or forwards, entire length 16½ in. £7 15 0

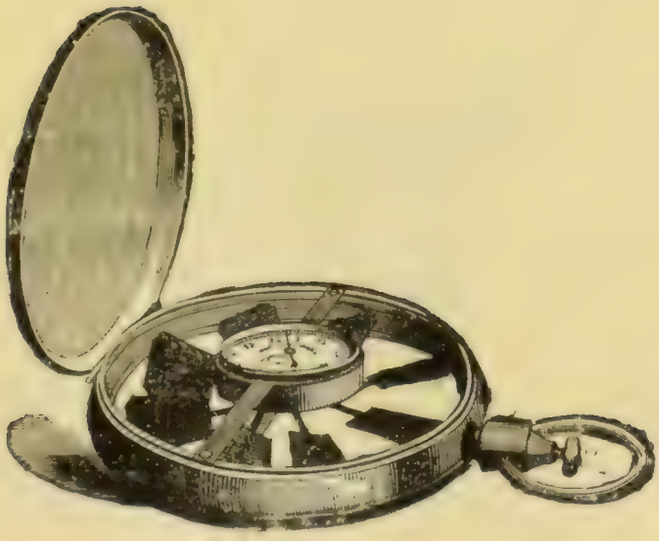


2459A



2459A I





2459A II

2459A III

2459A **Air Meter,** portable, for measuring the Velocity of Currents of Air in Coal Mines, Ventilators, Flues, with 2 Dials and Disconnector, to register 1,000 ft. ... £2 2 0

With 6 Dials ,, 10,000,000 ft. ... 2 15 0

2459A I .. Biram's, 4 in. diam., with 2 Dials, reading to 1,000 ft. 2 0 0

2459A II .. Pocket Form, 2 in. diam.... ... ... 2 15 0

2459A III ,, Robinson's, improved form, which admits of the Column carrying the Arms and Cups rising from the centre instead of the corner 3 10 0

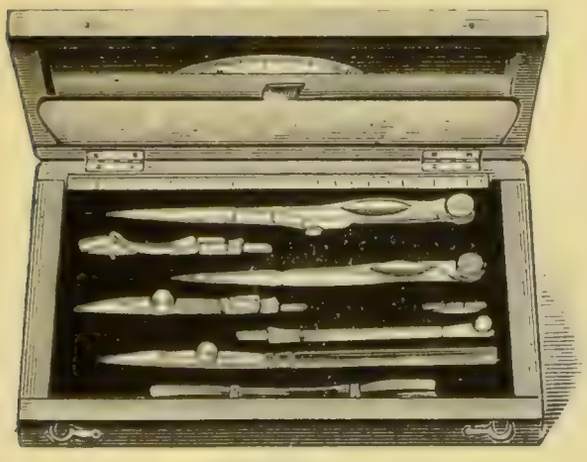
2459B **Sun Dials,** Brass, Horizontal, divided to five minutes, with 4 Engraved Compass Points and Gnomon—Diameter 4 in. £1 14 6
,, 6 in. 2 0 0



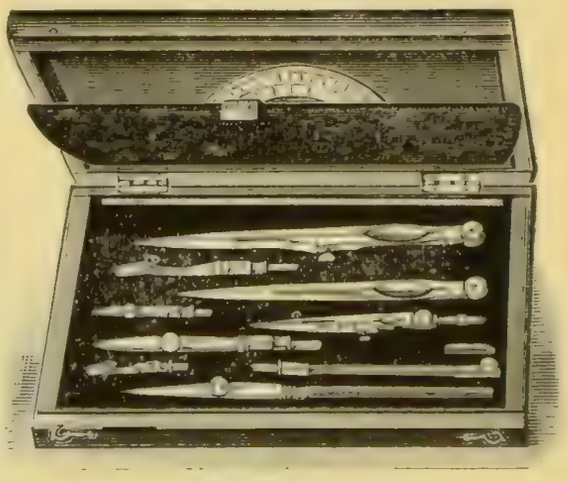
2459c

2459c **Universal Sunshine Recorder,** best make, on Polished Slate Slab, adjustable to any latitude, also forms a Sun Dial, and registers on a slip of card the duration of sunshine £9 10 0

One year's supply of Cards, for above 1 12 6



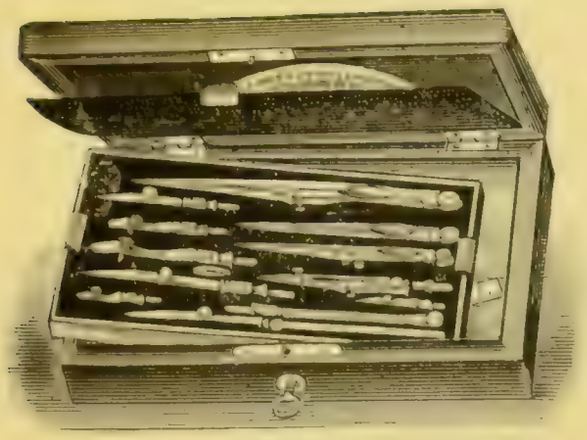
2460



2460A

2460 **Mathematical Drawing Instruments,** Brass, containing the following:—pair Compasses with Pen and Pencil Points, pair Dividers, Drawing Pen, Lengthening Bar, Crayon Holder, in Rosewood Case—
Instruments 4¼ in. long, each £0 2 6
,, 6¼ in. ,, ,, 0 3 6

2460A **Mathematical Drawing Instruments,** with extra Bow Compass— Instruments 4¼ in. long, each 0 3 6
,, 6¼ in. ,, ,, 0 4 6



2461

2462c

2461 **Mathematical Drawing Instruments,** better finish, containing 2 pairs Compasses with Pen and Pencil Points, Lengthening Bar, Drawing Pen, pair 3½ in. Compasses with Pen and Pencil Points, Brass and Horn Protractor, in Rosewood Box, Loose Tray, Lock and Key ... £0 7 6

2462 ,, Pair Brass Needle-pointed Compasses with Pen and Pencil Points, Lengthening Bar, Dividers with Rounded Points, Spring Bow Pen, Drawing Pen, Brass and Horn Protractors, Bevelled Edge Rule, in Rosewood Box, Loose Tray, Lock and Key 0 9 6

2462A ,, Brass Proportional Compass, pair 6¼ in. Needle-pointed Compasses with Pen and Pencil Points, Lengthening Bar, pair 4 in. Compasses with Pen and Pencil Points, Dividers, Spring Bow Compass, 2 Drawing Pens, Horn Protractor, Divided Rule, 2 Set Squares, and 1 Curve, complete, in Rosewood Case, Loose Tray, Lock and Key 0 13 6

2462B ,, Superior finish, with additional Instruments, each 21/, 42/ 3 3 0

2462c **Glass Model,** to show the system of Modern House Drainage, for Lecture use. A Valve Closet, B Syphon Flushing Cistern, C Wash-down Closet, D Ventilating Shaft, E Branch for w.c., F Soil Pipe, G Branch for w.c., H Bend or Foot of Soil Pipe, I Drain, J Air Shaft, K Intercepting Trap, L Drain to Sewer, M Zinc Tube returning Water to Reservoir, N Reservoir, O Base Box, P Brass Support. The set complete 3 5 6

2462D **Set of Models,** as recommended by the Science and Art Department, on Hygiene—

Ellison's Air Brick	£0	2	0
Sherringham Valve	0	6	0
Tobin's Tube	0	6	0
Sediment Trap, with Moveable Bucket	0	5	0
Set of 12 Earthenware Models of Pipes, Junctions, Traps, Channels, Bends, Gullies, &c.	1	4	0
Set of 5 Water Pipes—Ordinary Lead, Tin-lined Lead, Tin-lined Iron, Glass-lined Iron, Iron coated with Smith Solution	0	7	0
Mason's Dipstone Traps, in 2 half sections ...	0	6	0
Barometer Scale and Vernier	0	5	0
Set of above, in Box, complete ... ... nett	3	5	0

2462E **Model of Sewer Ventilation.** This Model demonstrates what occurs in a Sewer through changes of temperature, and by the filling and emptying during and after storms, under conditions of "No ventilation," "Partial ventilation," and "Perfect ventilation." Price, complete, with Box ... ... nett 1 0 0

2462F **Model,** to demonstrate Hot Water Circulation, consisting of a Glass Boiler with $\frac{3}{8}$ in. Glass Flow and Return Pipes, Supply Cistern and Branches ending with Draw Off, Bib Valves. The Water is charged with Amber Dust, which demonstrates the water movements, and a Lamp is provided to supply the necessary heating power. The whole is neatly arranged in a Case, which forms a suitable base for the Model when in working order. Price, complete, with Box ... ... nett 3 5 6

2462G **Diagrams,** "Hygiene," Science and Art List—

		Plain. s. d.	Coloured. s. d.
1	Source and Circulation of Water, showing various Phenomena, including Mists, Fog, Cloud, Mock Suns, Parhelia, Hail, Snow, Rain, Dew, Springs, Rivers, Rainbow, Sun as Motive Power, Rain Gauge, and Thermometric Scales	4 0	5 0
2	Pollution of Water, showing typical case at Caius College, Cambridge. How Constant Supply is affected; Bad Closet and Cistern arrangements; Evils of Shallow Wells; House Boats on Rivers; Heavy Agricultural Manuring; Aerial Contamination (organic and inorganic); Rain Water Sediment; Physical Features of Good Water; Classification of Potable Water...	4 0	5 0

		Plain. s.	d.	Coloured s.	d.
3	Purification of Water, showing Domestic and Public Filtration, with Specimens of various makes of Filters; Illustrations of defects in ordinary Filters, with Practical Suggestions for improvements; Rain Water Filtration and Separation; Distillation and Sections of London Companies' Filter Beds	4	0	5	0
4	Permeability and Classification of Soils, showing London Area; Water Disposition; Artesian, Deep and Shallow Well; Ordinary Pump; Water Ram, &c.	4	0	5	0
5	Inspired and Expired Air, with Diagrammatic Illustration, showing Inlet, Course, and Exit through the Lungs	3	0	4	0
6	Galton's Grate, showing in section Combustion and Ventilating arrangements	3	0	4	0
7	Section of House of Commons, showing Ventilating and Warming arrangements	3	0	4	0
8	Traps, including D Trap, Bell Trap, Mason's Dipstone, Defective Trap, &c.	3	0	4	0
9	Manhole, with Intercepter Cover, Channels, and Fresh Air Inlet	3	0	4	0
10	Water Closets, Wash-out, Wash-down, and Syphon	3	0	4	0
11	Old Pan Closet, with Container, D Trap, Safe Tray, and Water Supply	3	0	4	0
12	Good and Bad Drainage	3	0	4	0
13	Classification of Foods, &c.	2	0	—	
14	Standard Diets (various)	2	0	—	
15	Composition of Common Foods	2	0	—	
16	Elements and Compounds of Human Body ...	2	0	—	
17	Cyclones and Anti-Cyclones	3	0	4	0
18	Depressions, Wedges, &c.	3	0	4	0

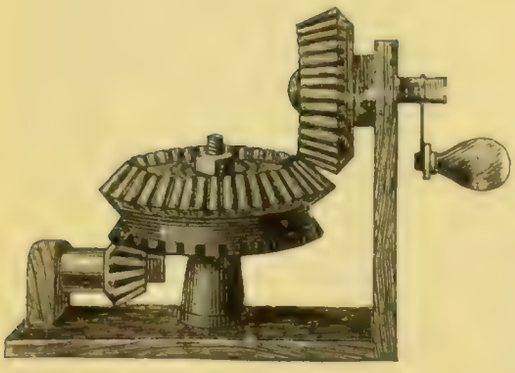
Price of complete Set of above Diagrams, Plain ... nett £2 14 0

Coloured ... ,, 3 8 0

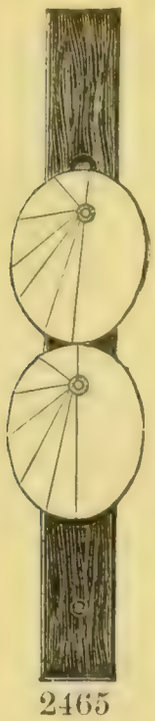
2462H **A Series of 50 Lantern Slides,** by permission of T. Pridgen Teale, M.A., from plates in his popular book, "Dangers to Health"—

No. of Plate in Book.	SUBJECT.
1	House with every sanitary arrangement faulty.
2	House with faulty arrangements avoided.
4	Waste Pipe of Kitchen Sink untrapped.
5	Kitchen Sink trapped, discharging into Gulley.
6	Kitchen Sink passing untrapped into Soil Pipe.
7	Defects in Lavatories and Baths.
8	"Unsyphoned" Traps.
9	Disused Traps. Evaporation.
10	Lavatory with Overflow joining Waste below Trap.
13	Housemaid's Sink passing untrapped into Soil Pipe.
14	Cistern feeding Kitchen Boiler. Overflow untrapped.
15	Waste of Bath and Sink cut off, and left open to the Drain
17	Fall and Ventilating Pipe opening near Window.
18	Vicious Ventilation of Drains.
19	"Rats, and the tale they tell."
20	w.c. faulty, and with faults corrected.
21	The "Pan Closet" and its substitute.
22	"Save-all" under w.c. passing direct into Soil Pipe.
23	Soil Pipe in Wall of Sitting Room.
25	Scullery Sink discharging over Dish Stone.
26	Dish Stone admitting Drain Gas into Larder.
27	"Dairy Sweepings."
28	Dish Stone leading into Tank under Floor.
30	"Sounding" for suspected Tanks or Cesspools.
31	Rain Water Cisterns and their dangers.
32	"How People drink Sewage," No. I.
33	"How People drink Sewage," No. II.
34	"How People drink Sewage," No. III.
35	Cesspool overflowing into a Tank.
36	Dampness of House—overflow of Cesspool
37	New Buildings over old Drains.
38	"Where *is* the Butler?"
39	Well under House fouled by leaking Soil Pipe.
41	Joints opened by settling of Foundations.
42	"Poisoned by next door neighbour's Drains."
44	Drain made of "Seconds."
45	"Putty Joints."
46	Curves made by straight Pipes.
47	Faulty Junctions.
49	Drain running up hill.
50	"Disconnected" and "Misconnected."
53	Economy in digging at expense of "Fall."
54	"Six-inch" Pipe between two "four-inch" Pipes.
56	"Terrace of the future on the refuse of the past."
57	Hunting for Drains—no Plans.
58	Drain blocked by Roots of Trees.
59	Cesspools under London Houses.
60	Soakings from Churchyard fouling Vicarage.
65	Manure Heap piled against Wall of House.
68	Ventilation without Dirt.

Prices, for a less number than 1 dozen, 1/6 each. Per dozen, 15/, package extra. For the Set of 50, including Box, nett £3 3 0



2464



2465

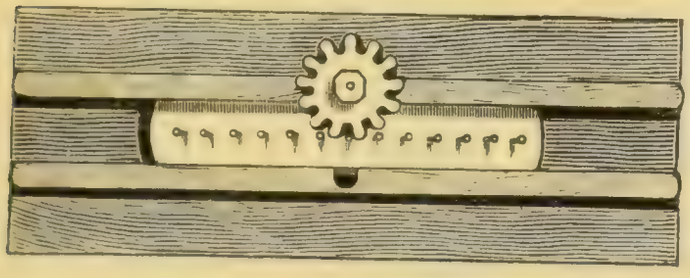


2466

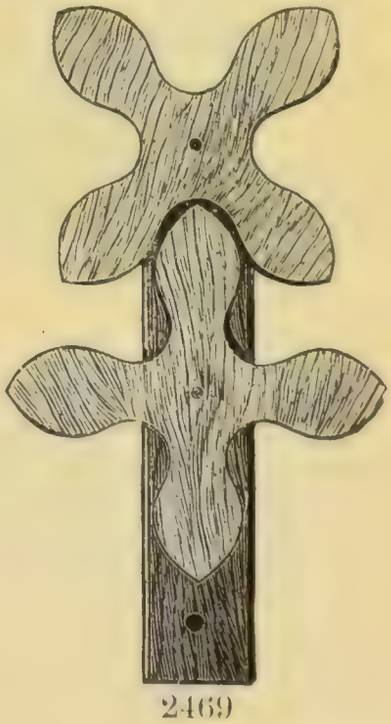
2464 **Model,** to illustrate the action of "Skew Bevils," for communicating motion between axes whose directions neither meet nor are parallel £1 1 0

2465 **Pair of Ellipses,** to explain the mode of obtaining the pitch circles of Toothed Wheels, and general principle of rolling contact 0 15 0

2466 **Set of 3 Eccentric and Elliptic Toothed Wheels** ... 1 7 6



2467



2469

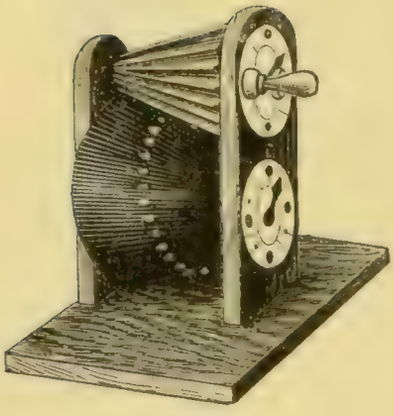


2468

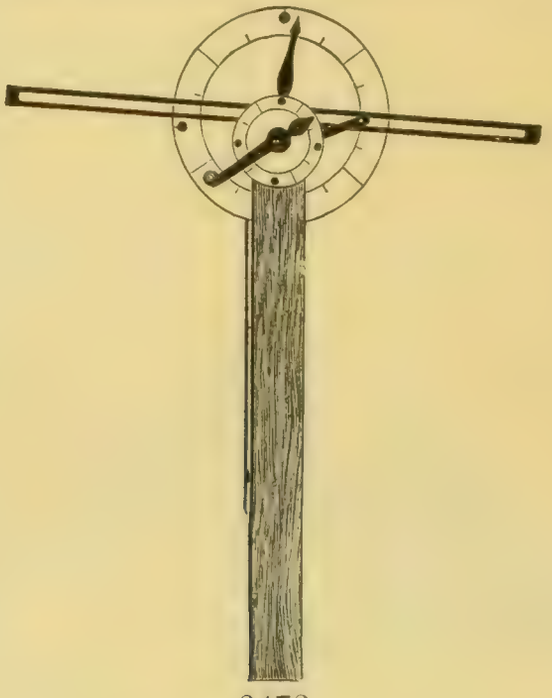
2467 **Mangle Wheel,** reciprocating motion £0 18 6

2468 **Reciprocating Motion,** produced by a Double Rack and Segmental Teeth 0 18 6

2469 **Two Spur Wheels,** of Wood, with Teeth of the epicycloidal form and of large size, prepared with surfaces showing the nature and direction of transmitted pressure during their sliding contact 1 0 0



2470

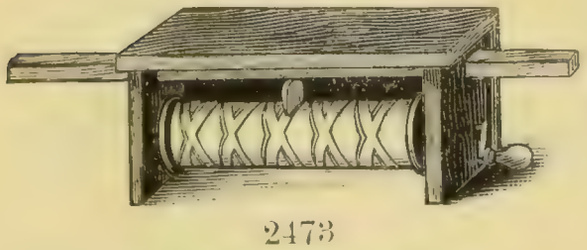


2472

2470 **Model** of a Conical Tcothed Wheel and Toothed Cone, to produce a rotation with varying velocity, upon Roemer's principle £1 7 6

2471 **Odontograph,** in Brass 1 5 0

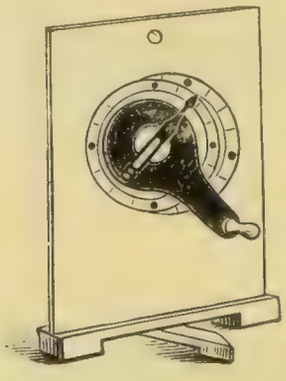
2472 **Eccentric Pin and Slit Bar,** with Discs to produce rotatory or oscillatory motions by sliding contact 1 10 0



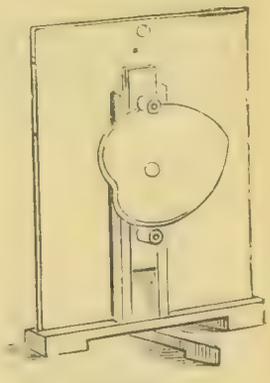
2473



2474



2474A



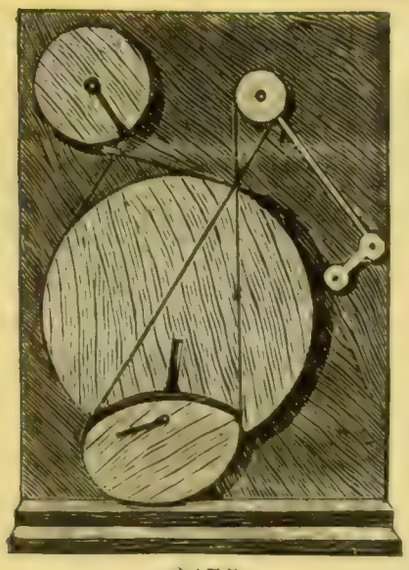
2474B

2473 **Screw,** returning into itself, used for the uniform and alternate traverse of a rod for such purposes as laying the thread on the bobbin in spinning £0 15 0

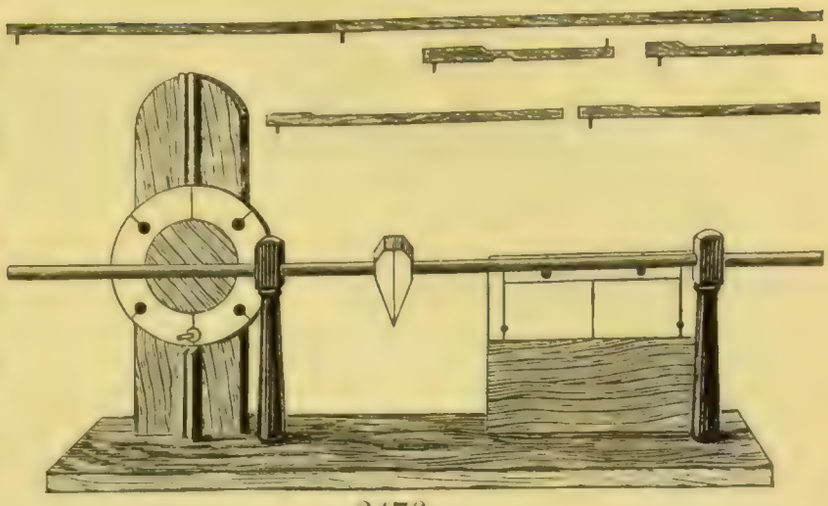
2474 **Reciprocating Motion,** produced by a Triple Toothed Rack 0 12 6
(This was used about the year 1690.)

2474A **Quick Return Motion** 1 2 6

2474B **Heart-Shaped Cam** 1 3 6



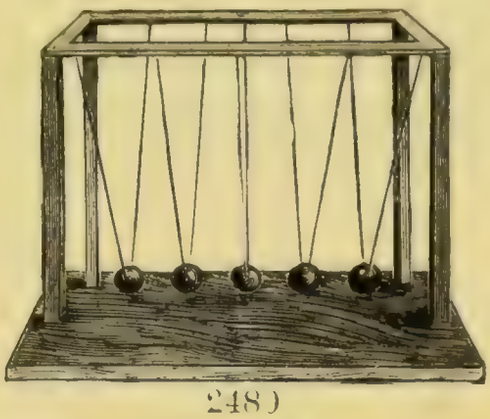
2475



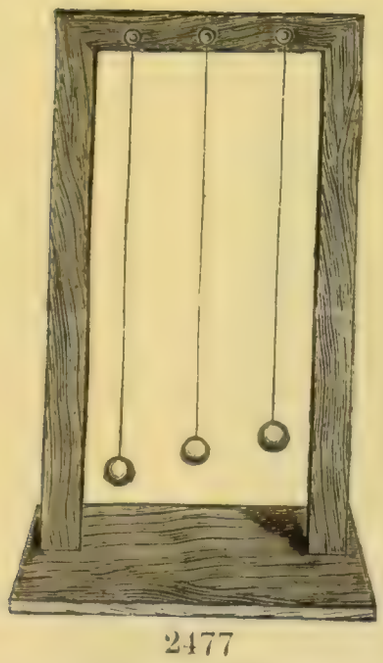
2476

2475 **Model,** to illustrate various conditions of wrapping contact or endless band motions £1 15 0

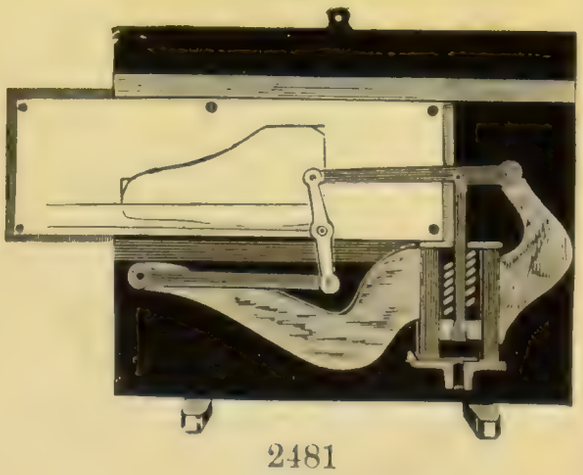
2476 **Rod,** reciprocating by means of an Eccentric Pin and Link, arranged so as to show the variations of its motion, which arise from different lengths of Links, and also to exhibit Booth's motion 2 0 0



2480



2477



2481

2477 **Simple Pendulum,** 3 Balls £0 6 0

2478 **Compound Pendulum,** 4 Pieces 1 0 0

2479 **Reversible Pendulum** 2 0 0

2480 **Percussion Machine,** with 10 Balls 0 10 6

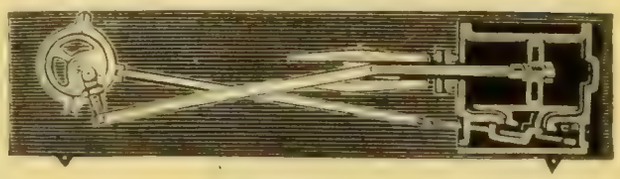
2481 **Model of Indicator,** Richard's form, for Steam ... 1 10 0

2482 **Diagrams of the Steam Engine,** by Professors Goodeve and Shelley, 41 Diagrams, 52½ Sheets, 40 in. × 27 in. ... 3 3 0

2483 „ Varnished and mounted on Rollers 8 13 0



2483A



2483C

2483A **Model,** to show the pressure on each of the supports of a girder due to a given load, also to show that this pressure is inversely proportional to the distance of the weight from each support; and to show the meaning of "Bending Moment" £3 0 0

2483C **Model of Steam Engine,** Working Model 2 10 0

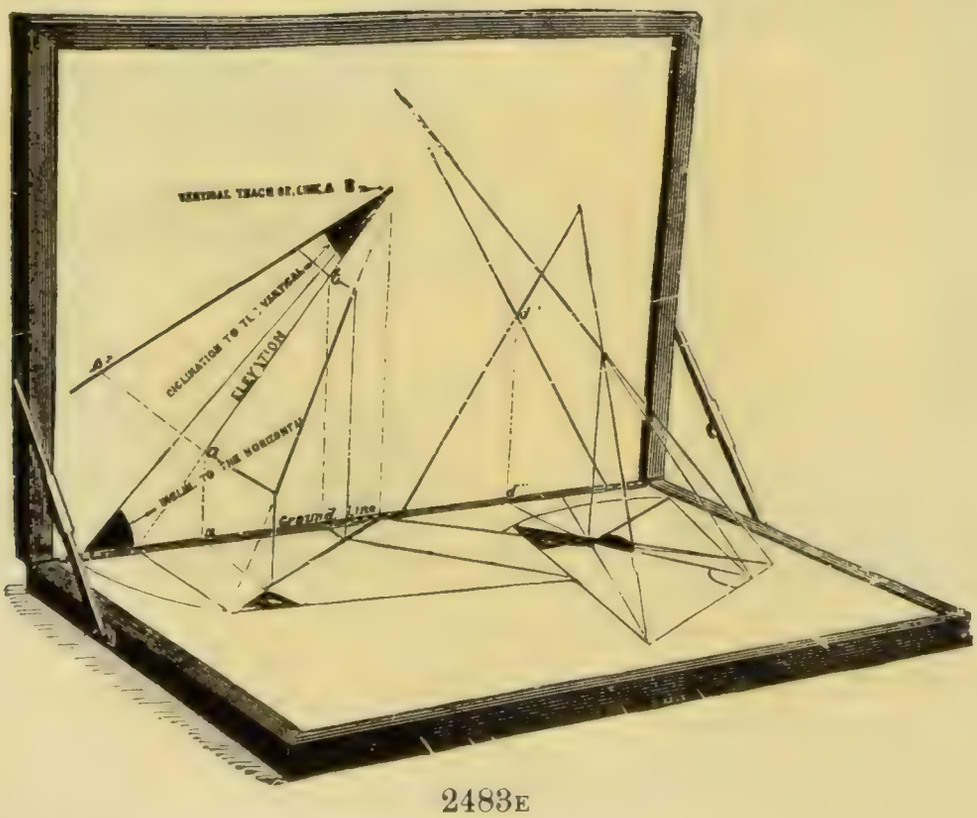
2483D **Parallel Motion,** 5 varieties: Beam Engine, Marine Engine, Small Steam Engine, Watts' Engine, and Scott Russell's Engine 4 0 0

PROFESSOR REYNOLDS, F.R.S., and CUSSONS' MODELS

FOR TEACHING

DESCRIPTIVE AND SOLID GEOMETRY.

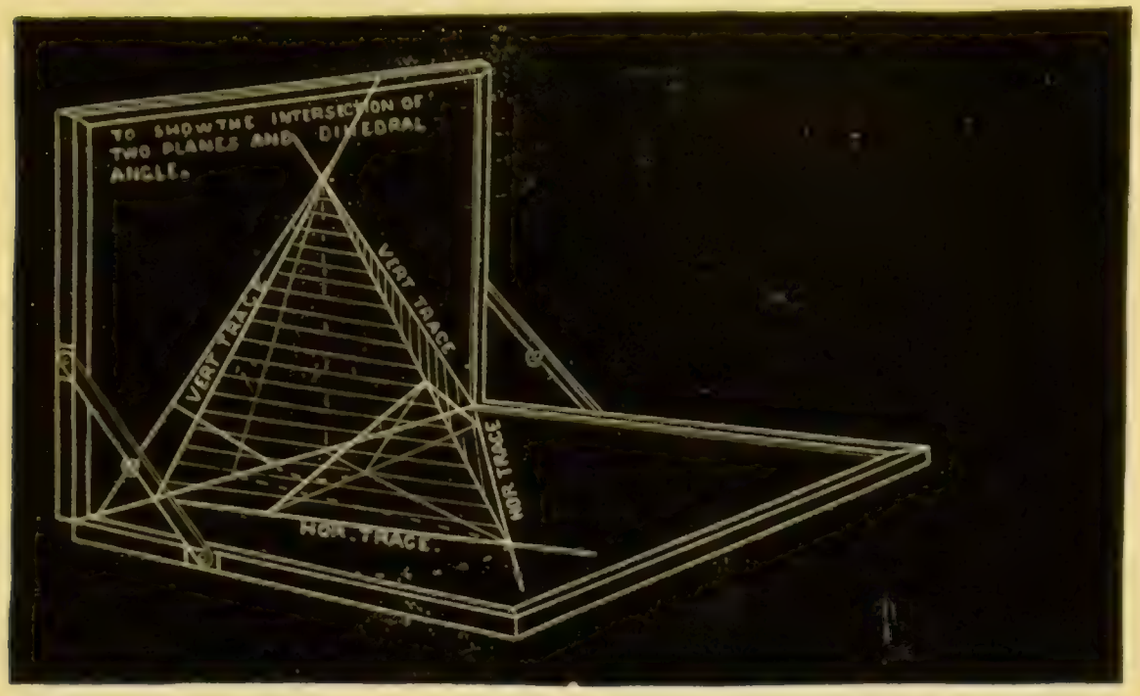
The Models consist of Folding Planes and Coloured Strings. The solutions are fully shown by Coloured Drawings, mounted and varnished. The Models are well made, portable, and durable, will fold up neatly, and are always ready for use.



2483E

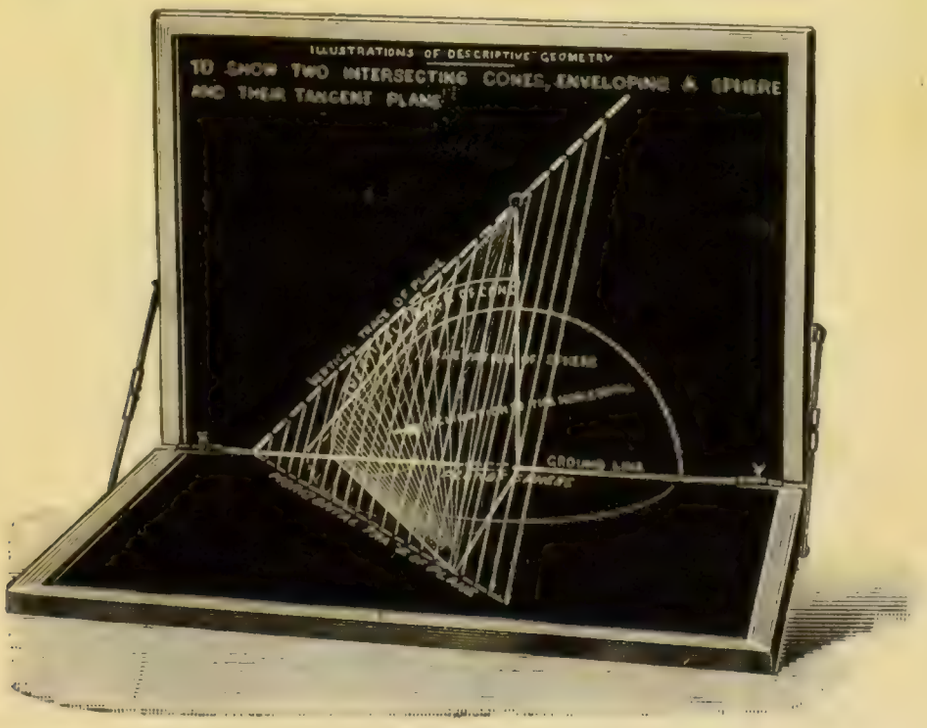
2483E Shows straight lines, their projections, traces, intersections, inclinations, methods of finding true length, angle between two lines... ... ... nett £1 10 0

2483F Shows a plane, its traces, the relation between the traces of a plane and the traces of lines lying in it, also between the traces of a plane and the projections of a normal. Horizontal line in a plane. Intersection of a line and a plane. Inclination of a line to a plane. Through a given point to draw a plane at right angles to a line ... nett £1 10 0



2483G

2483G Shows two intersecting planes, their traces, intersection, also method of determining the dihedral angle ... ... nett £1 10 0

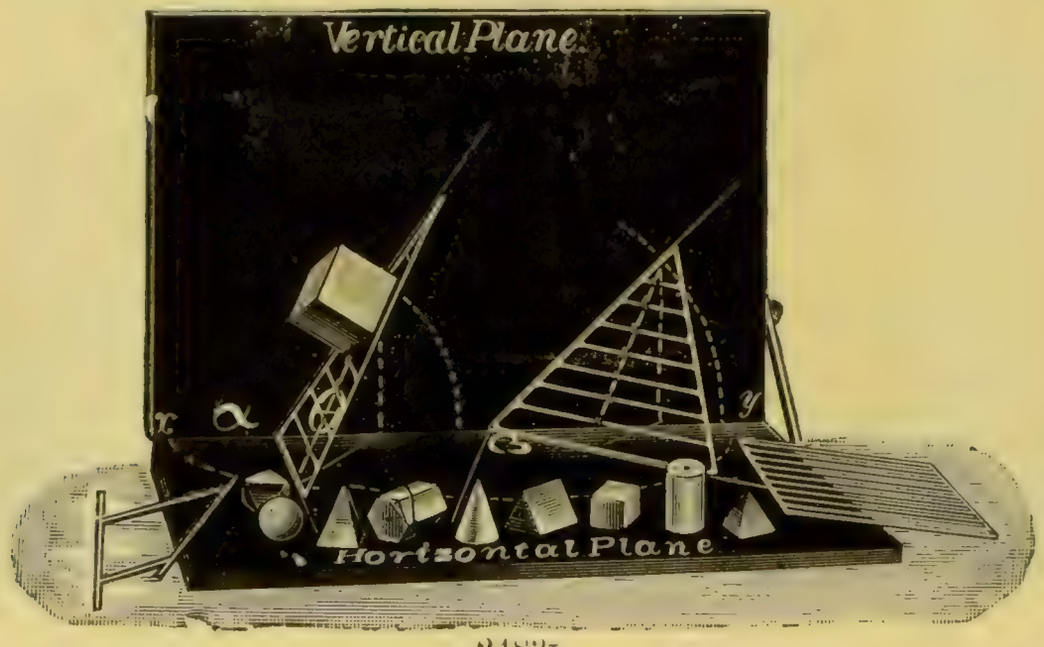


2483H

2483H Shows a pair of cones enveloping a sphere, and a plane tangential to them. Method of drawing a plane at given inclinations to the co-ordinate planes ... nett £1 10 0

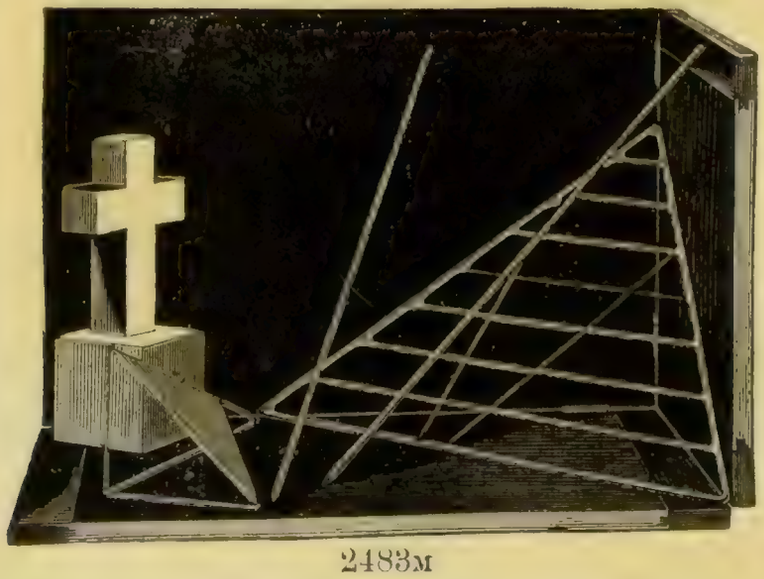
2483J **Folding Model,** with Coloured Strings, as above, showing two parallel oblique planes (traces parallel) and the method of finding the real distance between them, and conversely to draw two parallel planes at a given distance apart. Also showing various lines lying in the parallel planes, nett £1 10 0

2483K **Folding Model,** with Coloured Strings, showing a plane lying upon a cone and containing a given straight line. Illustrating the problems of drawing a plane at a given inclination and containing a given straight line, nett 1 10 0



2483L

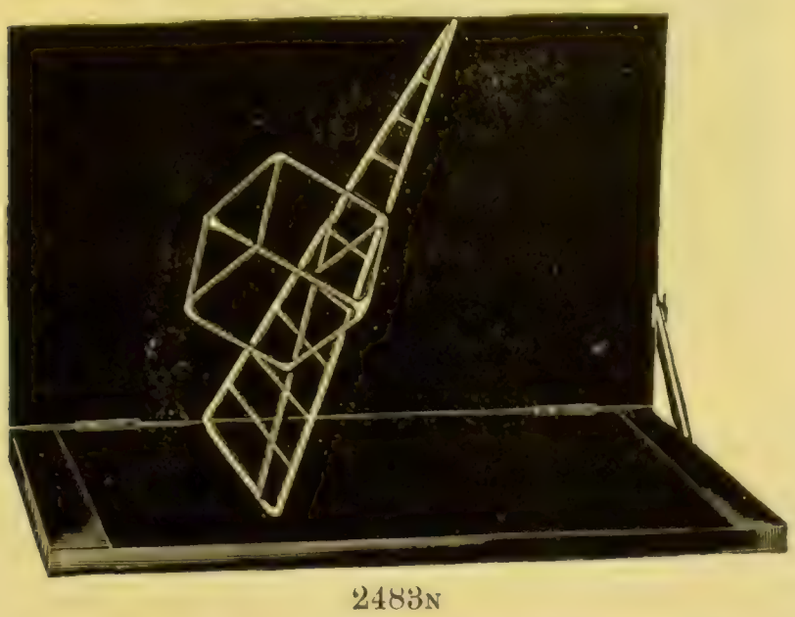
2483L **Blackboard,** folding plane, capable of assuming either a flat or right angled position, with which are supplied moveable wire planes and objects of form to illustrate rabbatment, the real angle between the traces of planes, placing a line in a given plane, showing special problems, &c. The principal lines are painted on the Model ... nett £1 0 0



2483M

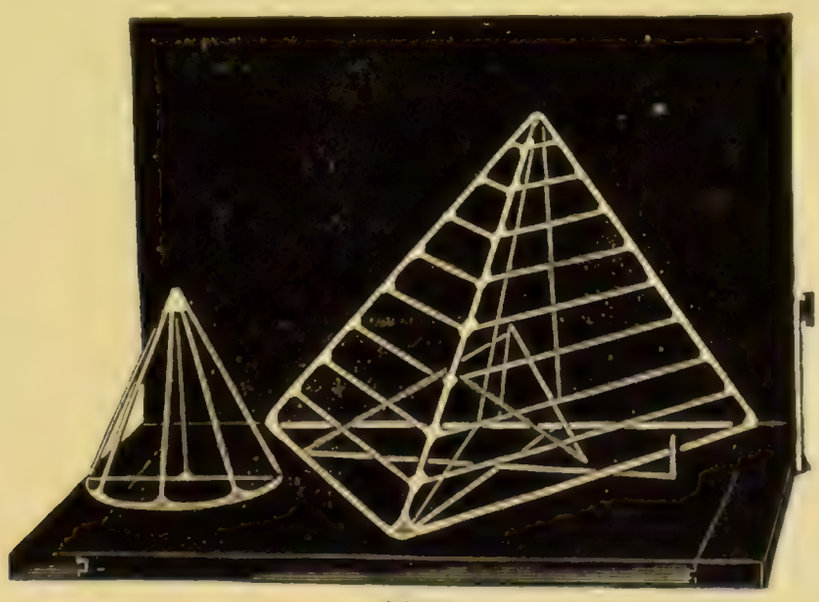
2483M **Small Blackboard,** "Class" Model, 12 × 9 in., with prepared surface for chalk lines, moveable planes, and objects of form, showing three planes of projection,

and illustrating the following :—Alteration of ground line, with a projection on a new vertical plane; finding the vertical trace of a plane upon a second vertical plane of projection; horizontal line in a plane; method of finding the inclination of a plane; showing a line in all possible positions relative to the planes of projection; rabbatment, &c. ... ... nett £0 10 0



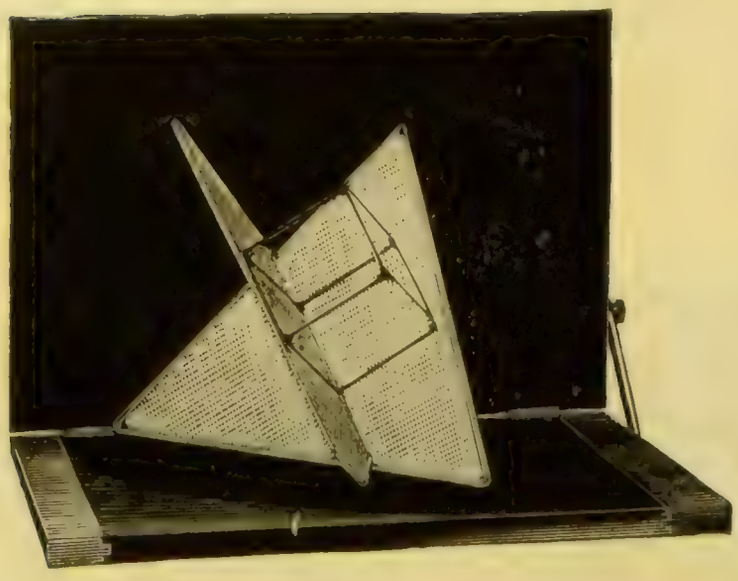
2483N

2483N **Model,** consisting of moveable (or folding) horizontal and vertical plane, showing cube on an inclined plane with inclination of a face and edge; also illustrates the manner of placing a line on an inclined plane ... nett £1 5 0



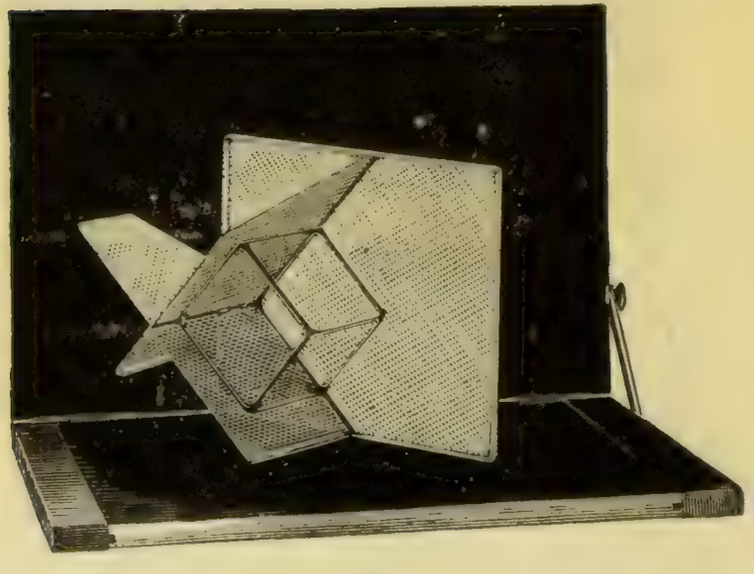
2483O

2483O **Model,** consisting of a moveable horizontal and vertical plane and two oblique planes, with wire model showing the lines used to find the dihedral angle between two planes, and a semicone which serves to show the method of finding the inclination of an oblique plane to the horizontal or vertical plane ... ... nett £1 6 0



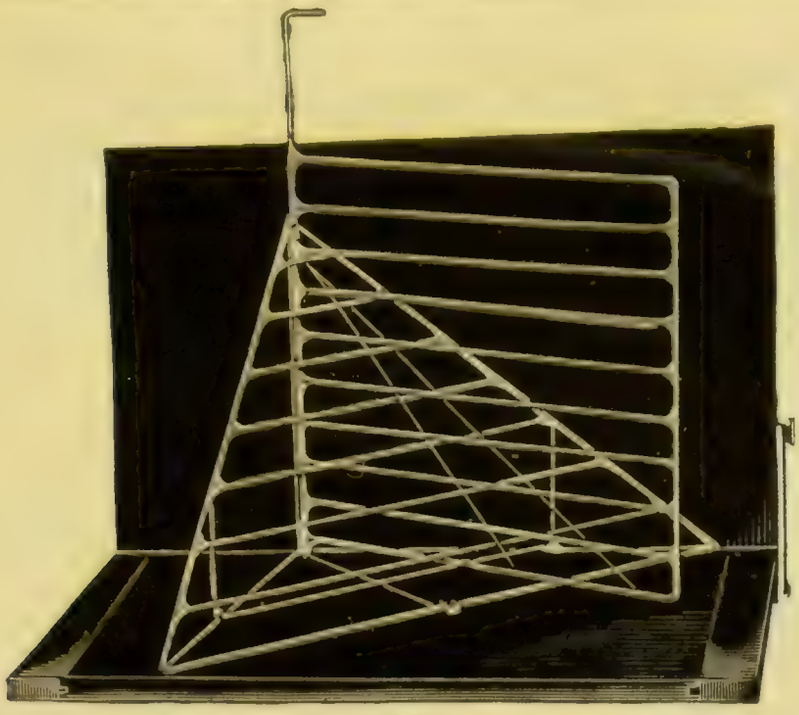
2483P

2483P **Model,** consisting of a moveable (or folding) horizontal and vertical plane, together with an inclined and an oblique plane perpendicular to each other, and a cube, two faces of which are contained by the two planes; illustrating the method of projecting a solid when the inclination of two faces is given ... ... nett £1 13 0



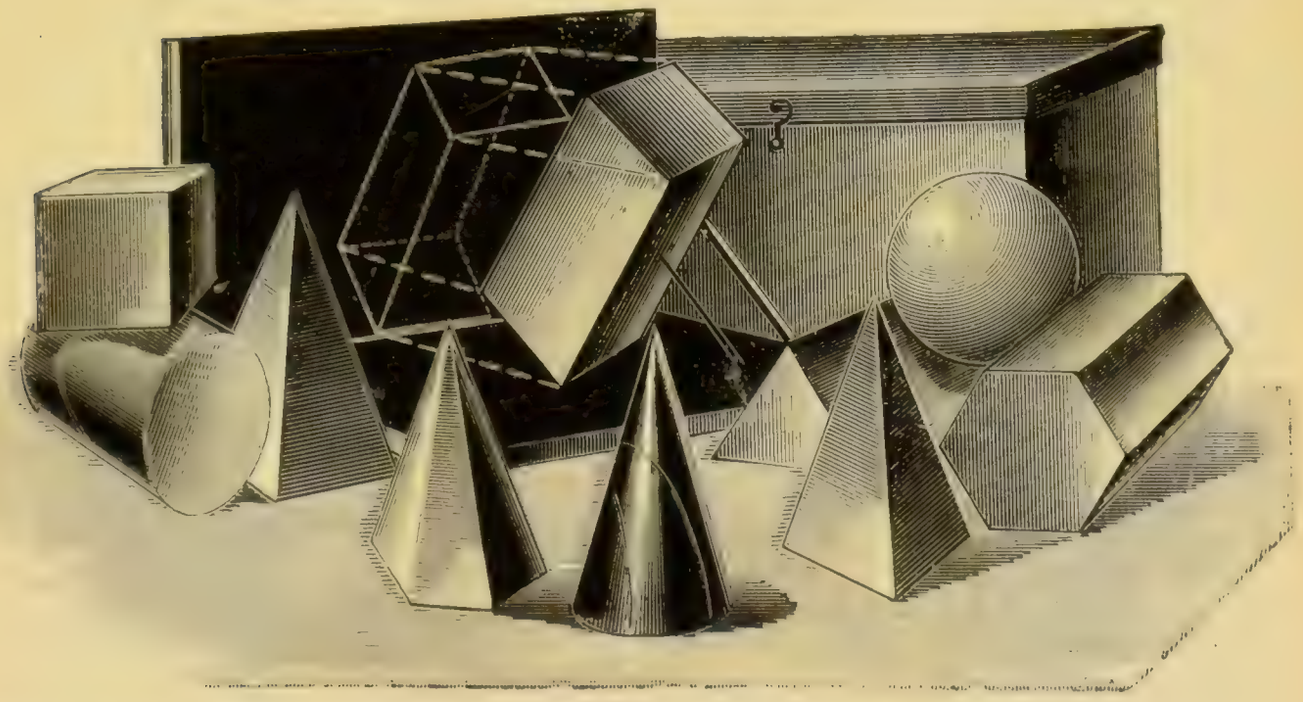
2483Q

2483Q **Model,** with a third plane perpendicular to the other two, and containing a third face of the cube, thus showing the inclination of all the faces of the cube ... nett £2 0 0



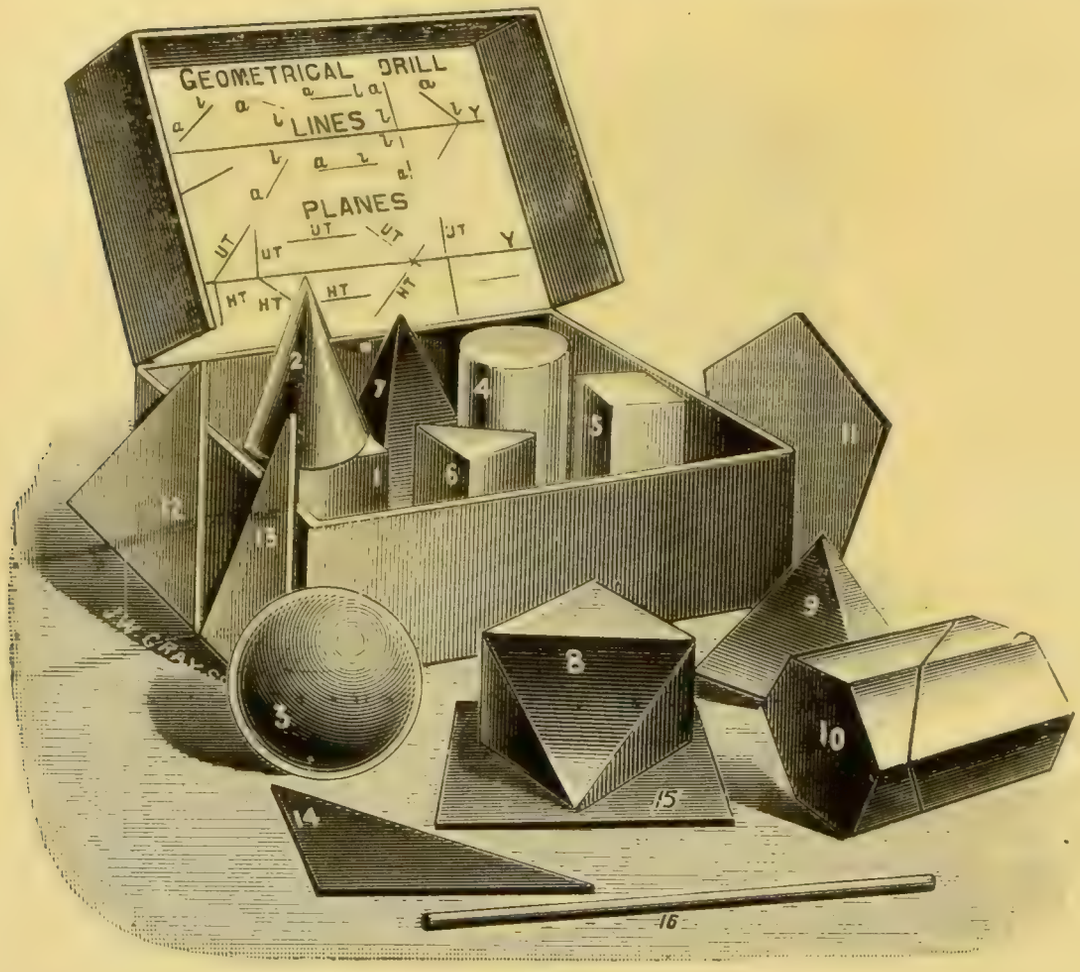
2483R

2483R **Model,** showing horizontal and vertical planes of projection, and also a third vertical plane capable of swinging at any angle to the former. This Model is designed to explain the method of finding the new vertical trace of a plane on any new ground line, and demonstrates also the convenience (for working problems) of assuming a ground line at right angles to the horizontal trace of an oblique plane ... ... nett £1 5 0



2483S

2483S **The "Class" Set of Geometrical Models and Blackboard Folding Plane.** Height of Models, about 5 inches; made of Hard Wood. Square Prism, Triangular Prism, Hexagonal Prism, Cylinder in Section, Cube, Square Pyramid, Triangular Pyramid, Hexagonal Pyramid, Cone (two sections), Sphere, Folding Plane with Prepared Surface for Chalking. Complete Set, with Box nett £0 10 0



2483T

2483T **"Pupils" Set of Geometrical Models,** designed for the use of Students in Practical, Plane, and Solid Geometry, comprising 16 accurately finished Models and Figures in Hard Wood, as per illustration. Box, with Hinged Lid and Elastic Band, complete ... ... nett £0 2 · 0

CONTENTS.

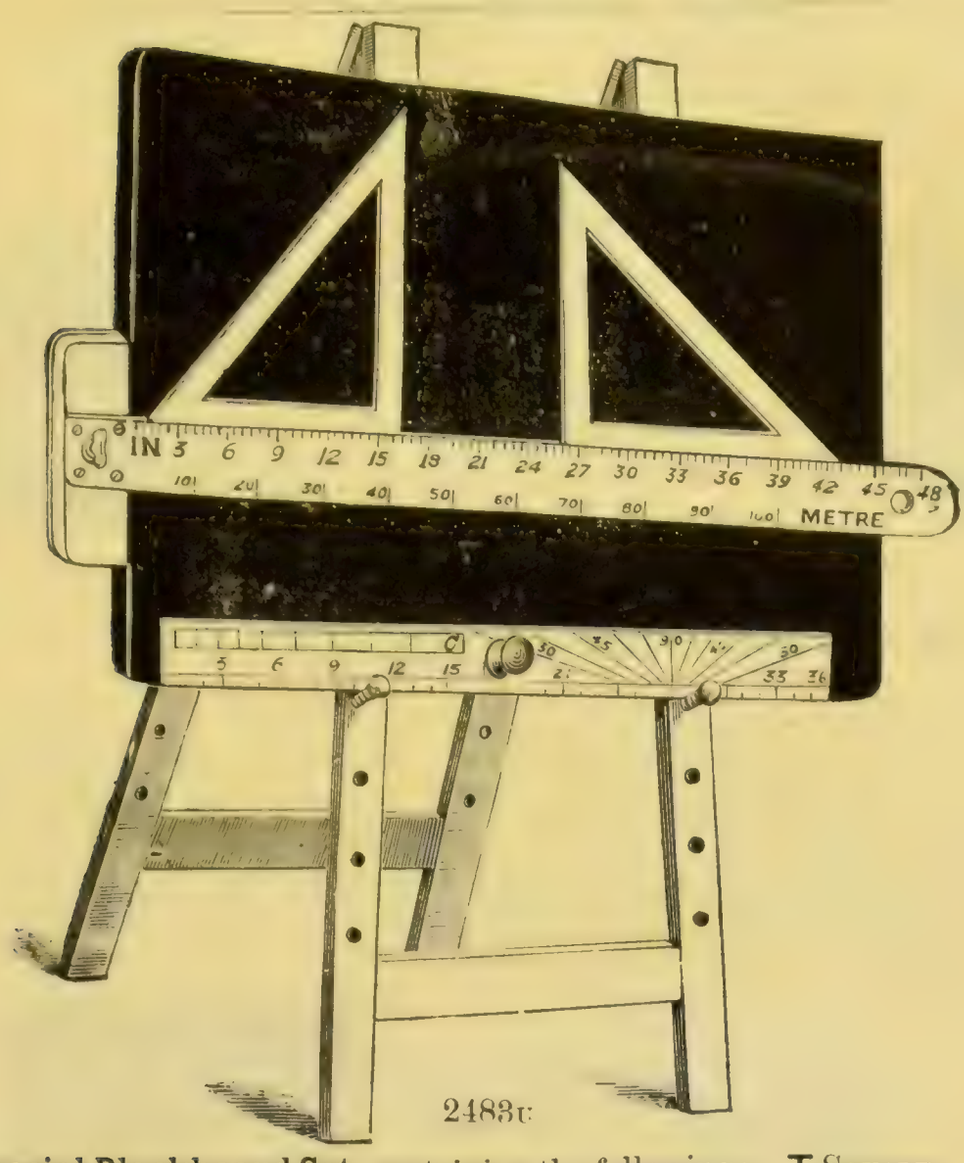
1 Cube
2 Cone
3 Sphere
4 Cylinder
5 Square Prism
6 Triangular Prism
7 Square Pyramid
8 Octahedron
9 Tetrahedron
10 Hex. Prism (section)
11 Pentagon
12 Equilateral Triangle
13 Isosceles Triangle
14 Right-angled Triangle
15 Square
16 Straight Line

It is recommended that each pupil, as far as practicable, be supplied with a set of models, and that the teacher conduct the class through a sort of Geometrical drill, as indicated by the diagram, the pupil himself using and performing the drill by means of the various figures in the box of models. The solid models may also give great assistance to students in the solution of problems.

The drawing paper will serve as a horizontal plane, and the set square may be improvised as a vertical plane of projection.

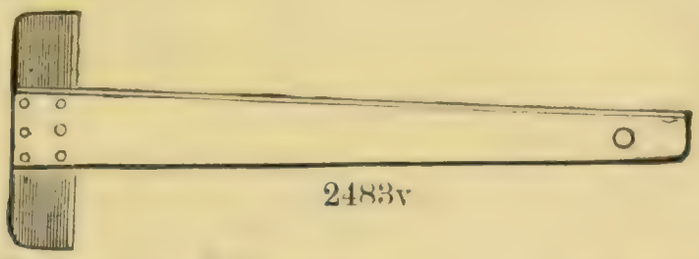
It is most important for students to acquire the above habit as it serves in good stead at examinations.

A supplementary set of larger size for teachers' use at platform, in Box, 30/



2483u

2483u **Special Blackboard Set,** containing the following:—T Square (48 in.), with fixing head. Will *fix* instantly on the blackboard, thus allowing free use of the hands to use the Set Squares. The T Square is boldly marked with inches and a comparative scale of metres. Ruler (36 in.), with handle and bevelled edge; marked with inches; scale of chords, angles, decimal scale, engineers' scale. Set Squares (18 in.), framed and keyed. All made of Polished Oak and extra strong. Blackboard (48 × 36 in.), slate surface, well adapted for drawing. Easel (6 ft.), pitch pine, double-legged, extra strong ... ... nett £2 2 0



2483v

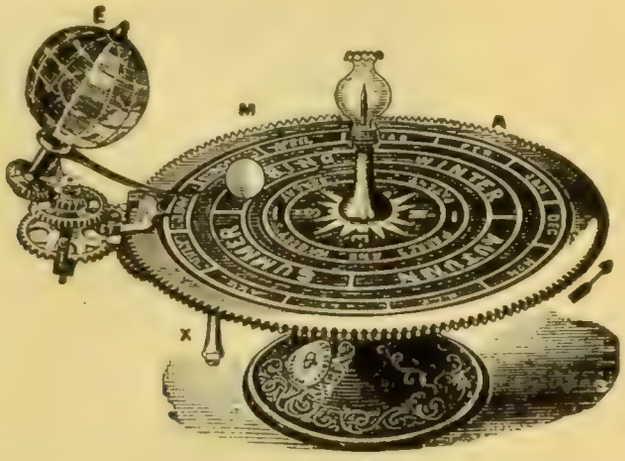
2483v **Taper Blade English T Squares**

Length of Blade. Inches.	Pearwood. Each. s. d.	Mahogany. Each. s. d.	Mahogany. Edged with Ebony. Each. s. d.
12	0 7	0 9	1 3
15	0 9	1 0	1 6
18	0 11	1 3	2 0
24	1 6	2 0	2 6

Moveable Stock, for angular lines, Brass Screw and Nut, 1/ each extra.



2483w



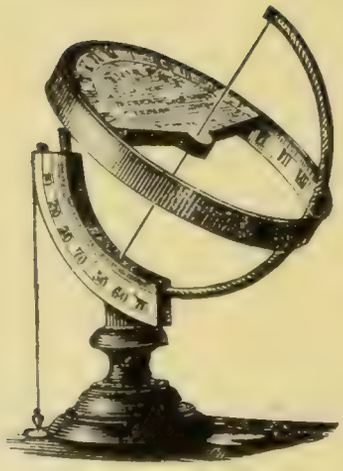
2483x

2483w **Globes,** for the Schoolroom, in Stained Wood Frames—

9	12	18 in. diam.
£2 10/	£2 15/	£5 per pair, nett

,, in Mahogany Frames per pair, nett, £2 15/, £3 5/, £6 0 0

2483x **School Orrery,** for illustrating the motions of the Earth and Moon, complete, in Box 1 4 0



2483y



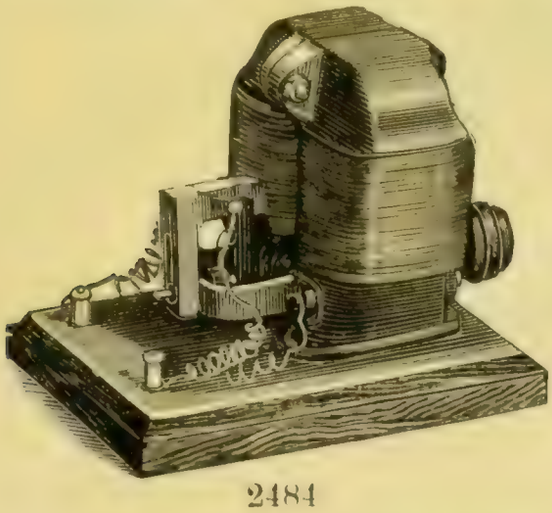
2483z

2483y **Portable Sun Dial,** adjustable for all latitudes, and fitted with Compass ... ... nett £0 3 0

2483z **New Popular Globe,** printed in Colours, with principal Ocean Currents and Commercial Highways clearly shown, mounted on Brass Semi-meridian, on Polished Stand, packed in Cardboard Box ... ... nett 0 5 0

HAND DYNAMO MACHINES.

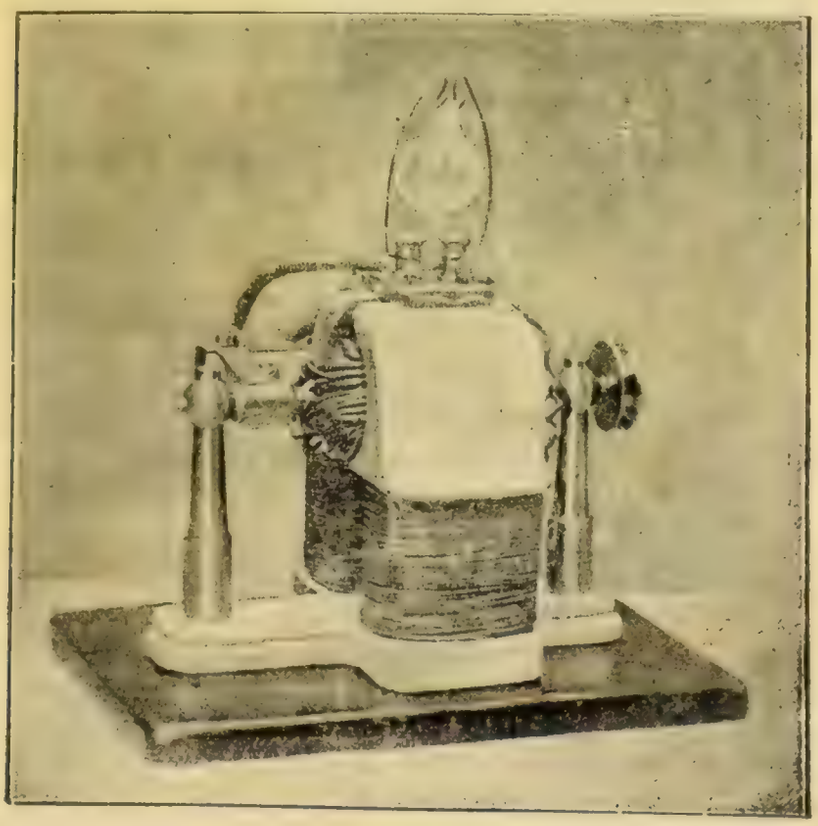
(All these Dynamos and Motors are Best English Make.)



2484

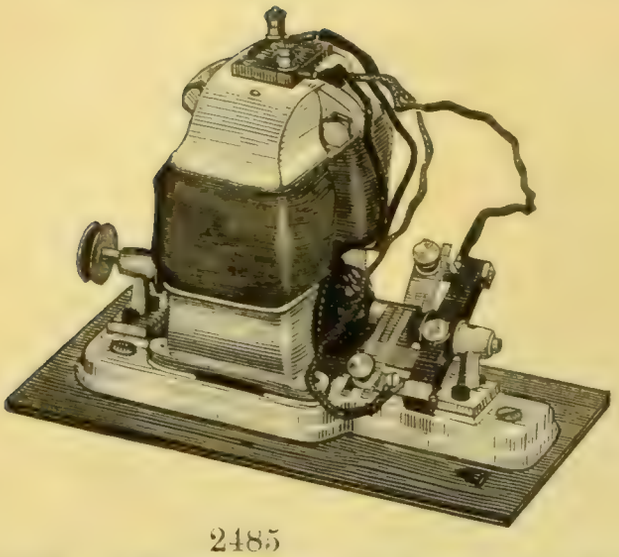
2484 **"Bishopsgate" Dynamo,** No. 1.—This Machine will give 5 volts and 3 ampères, light 2 5-volt Incandescent Lamps, 2½-candle power, in parallel, heat and fuse Wire, work Induction Coils, decompose Water, &c., will run as a Motor if supplied with current from a Battery; mounted on Wood Base £1 12 6

With Hand Driving Wheel 2 2 0

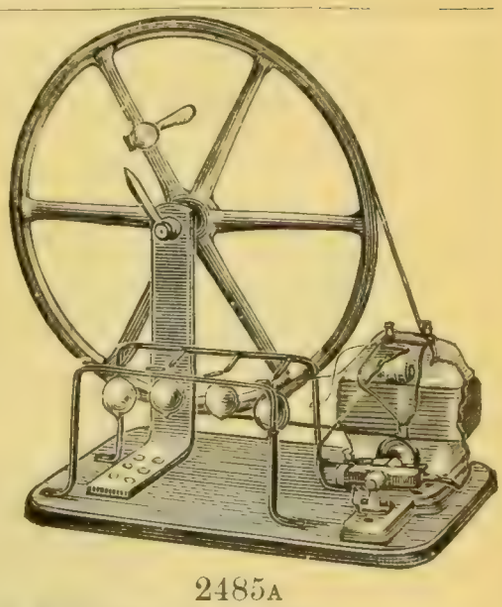


2484A

2484A **"Bishopsgate" Dynamo,** smaller size, No. 0.—Shunt wound gives about 4 volts and 1 ampère, and will light 1 small Incandescent Lamp. Without Lamp £0 18 6



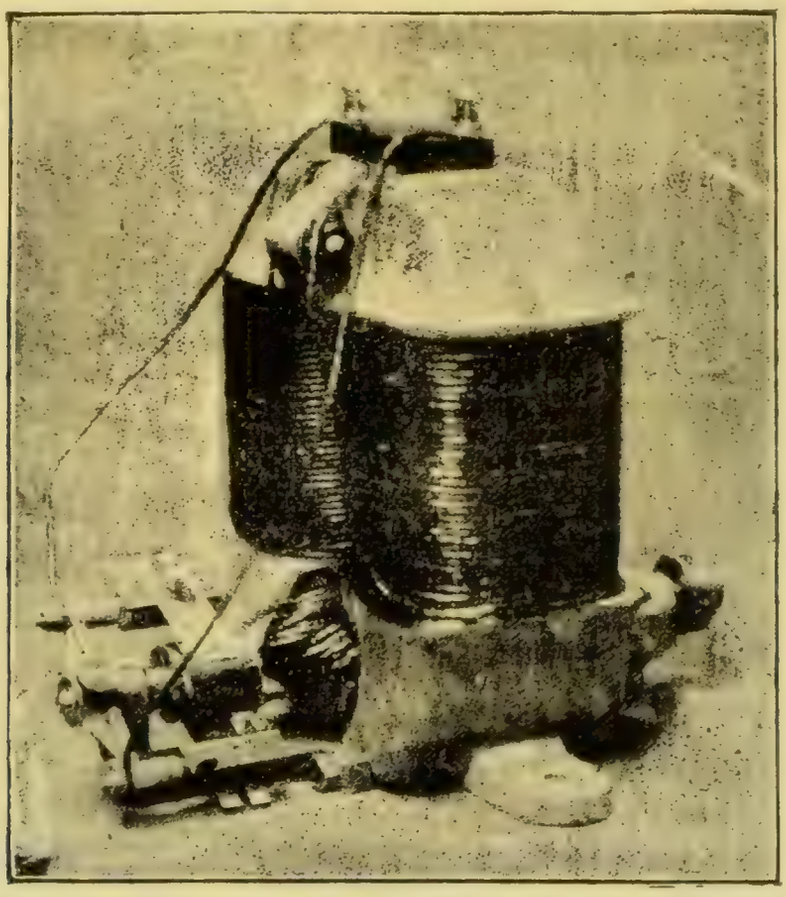
2485



2485A

2485 **"Bishopsgate" Dynamo,** No. 2.—This Machine will give 10 volts and 5 ampères, light 4 10-volt Incandescent Lamps, 5-candle power, in parallel, and carry out the same experiments as No. 1; mounted on Wood Base ... £3 3 0

2485A With Hand Driving Wheel 4 4 0

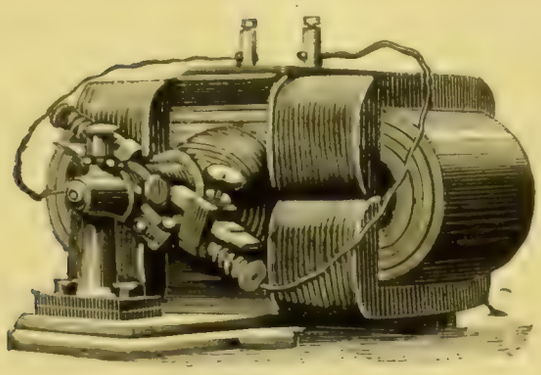


2486

2486 **"Bishopsgate" Dynamo,** No. 3.—This Machine will give 15 volts and 9 ampères, light 8 15-volt Incandescent Lamps, 5-candle power, in parallel, when run by steam power at 3,000 revolutions per minute; mounted on Mahogany Base £5 5 0

With Foot Driving Gear 6 10 0

The above Machines can be used for charging Accumulators, and run from power for long periods without heating. They have been specially designed to give a voltage sufficient for usual experimental work, the aim being to secure as large an output of current as possible. They are built on Siemen's shuttle principle. The Brushes are made with rocking gear so that the effect produced by altering the position of the Brushes may be shown.



2486A

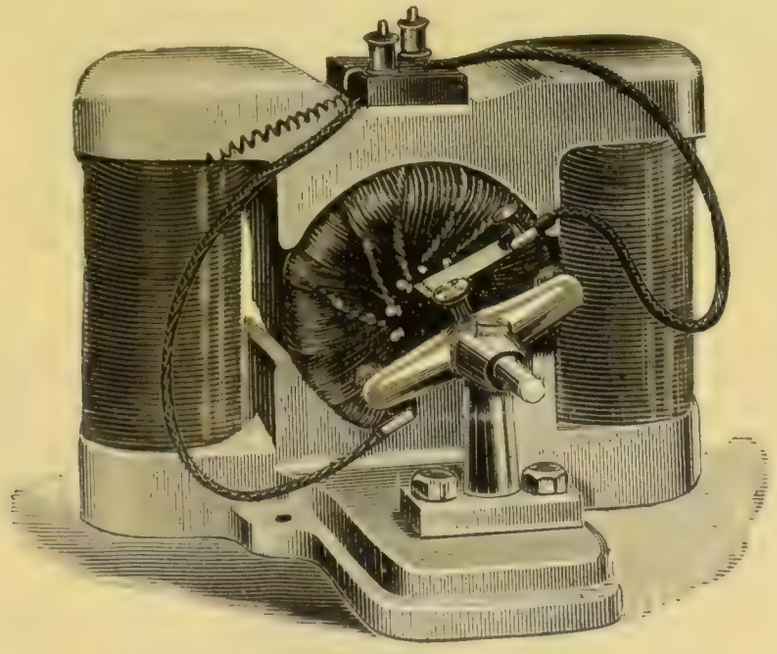
2486A **Patent Dynamos,** larger sizes. ¼ Horse Power ... £17 0 0

½ ,, ,, ... 32 0 0

¾ ,, ,, ... 40 0 0

1 ,, ,, ... 50 0 0

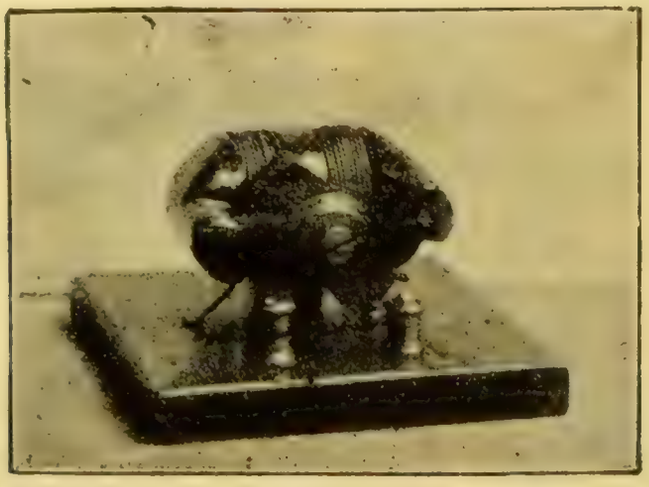
These Machines have Wrought Iron Field Magnets, they are of high efficiency, have Drum Armatures, and can be supplied shunt or series wound, but will be supplied shunt wound unless otherwise stated. The Brush Gear is an improved design, the Machines can be wound for any desired voltage, and can be used with excellent results as Motors.



2486B

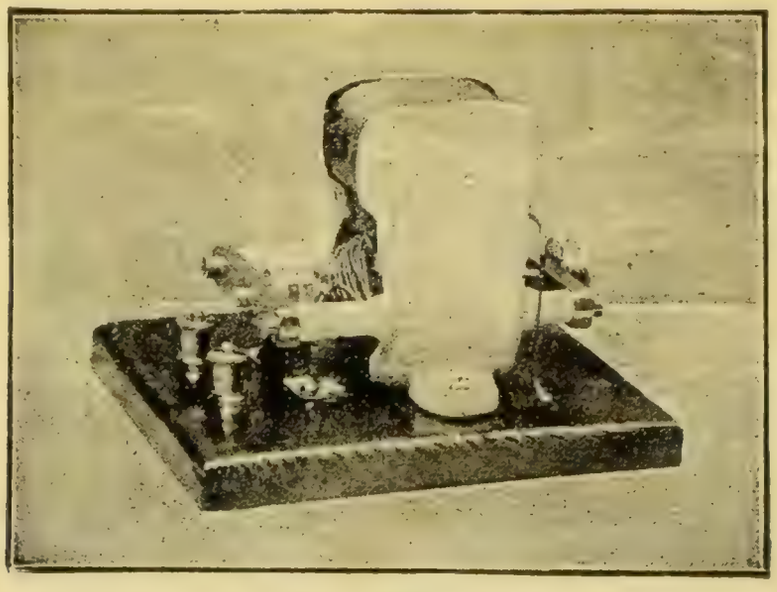
2486B **Ring Armature Dynamos,** wound to give 25 volts 6 ampères, 2,400 revolutions per minute, unless specially ordered for different voltage. Especially suitable for charging Accumulators, or will run as a Motor giving ⅙ H.P. £7 10 0

2486C ,, Smaller size, wound to give 10 volts 5 ampères, suitable for Hand Gear 6 10 0



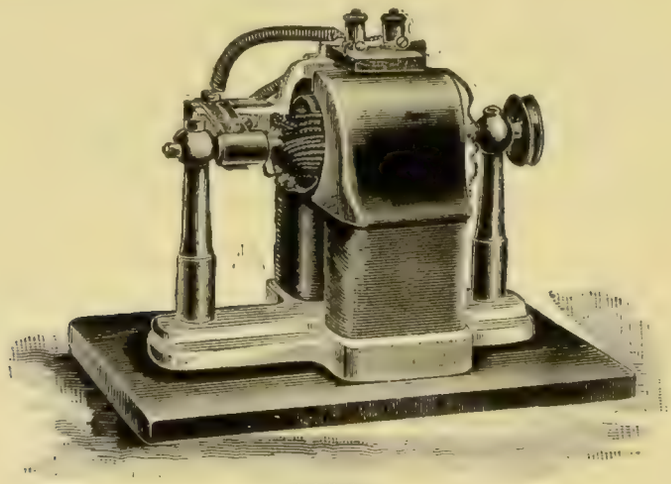
2486D

2486D **Motor,** No. 1, for very light work or for running small Models, can be worked with 1 or 2 Dry Cells £0 5 0



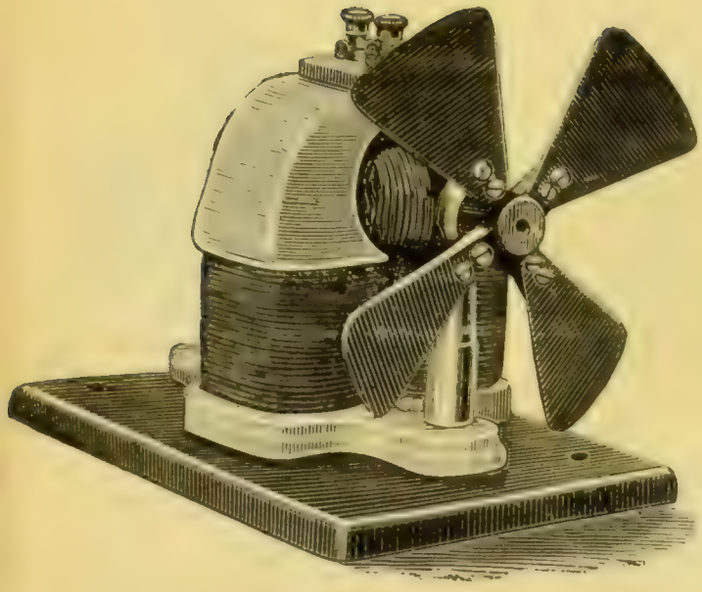
2486E

2486E **Motor,** No. 2, for light work, rotating Fans and small Vacuum Tubes, works very satisfactorily with one of the small Dynamos £0 10 6

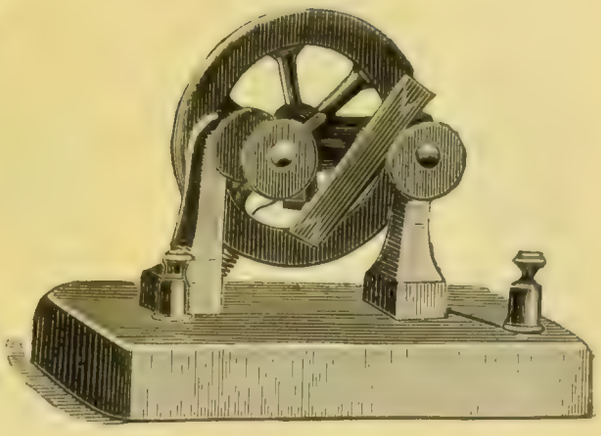


2486F

2486F **Motor,** No. 3, same as above, but larger, to run with a No. 2 Dynamo £0 17 6



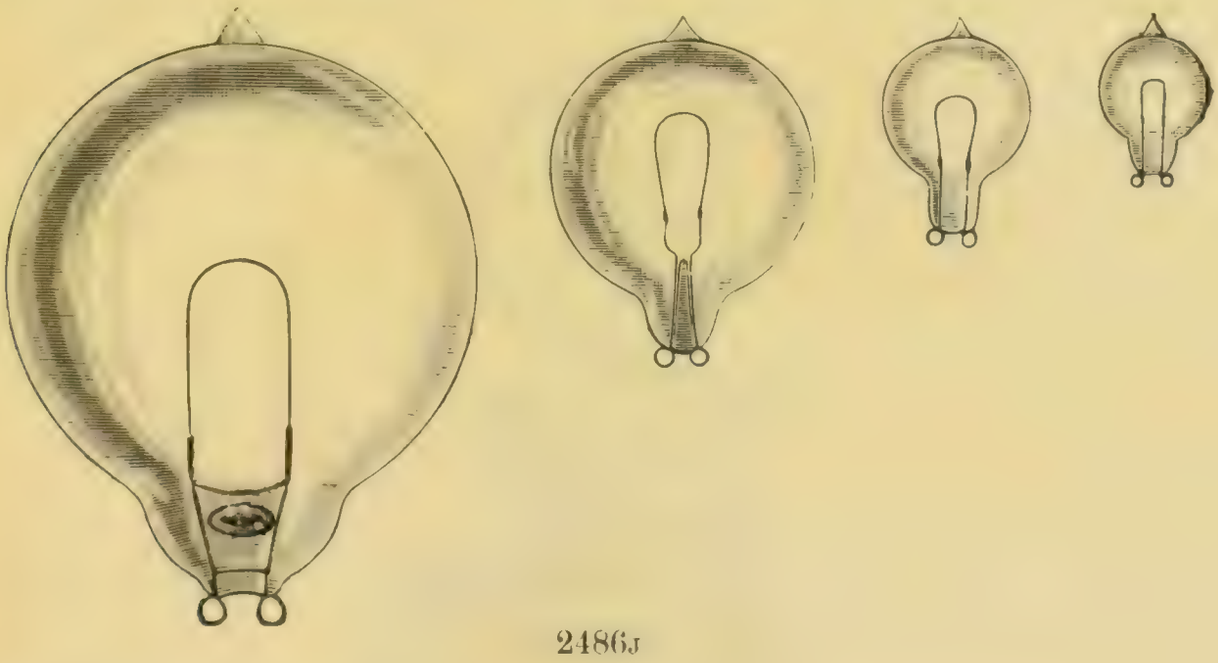
2486G



2486H

2486G **Motor,** for alternating current, with Fan £1 5 0

2486H **Small Fly-Wheel Motor,** suitable for running from a Single Cell Battery, mounted on Polished Wood Base ... 0 12 0



2486J

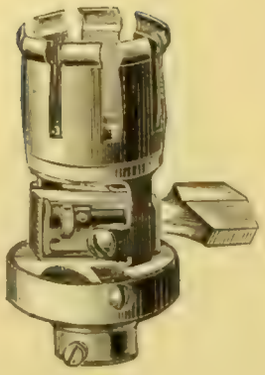
2486J **Incandescent Lamps,** with Carbon Filaments—

Volts.	Ampères.	Candle Power.			
2 to 4	1	½ to 1	£0	1	6
7 „ 10	0·5	1	0	1	9
11 „ 14	0·5	2	0	2	0
15 „ 20	1	5	0	2	3
20 „ 25	1	8	0	2	6

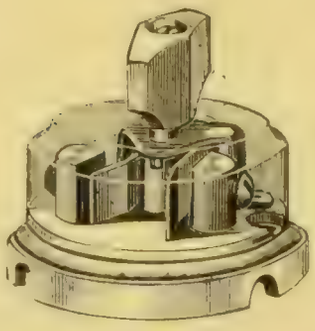
2486K „ „ small, 3 to 4 volts, in Coloured Glass, each 0 2 0



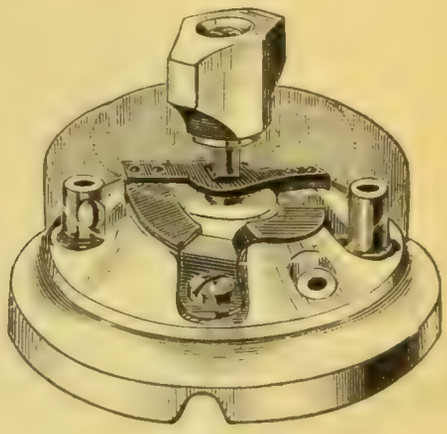
2486L



2486M



2486N



2486O

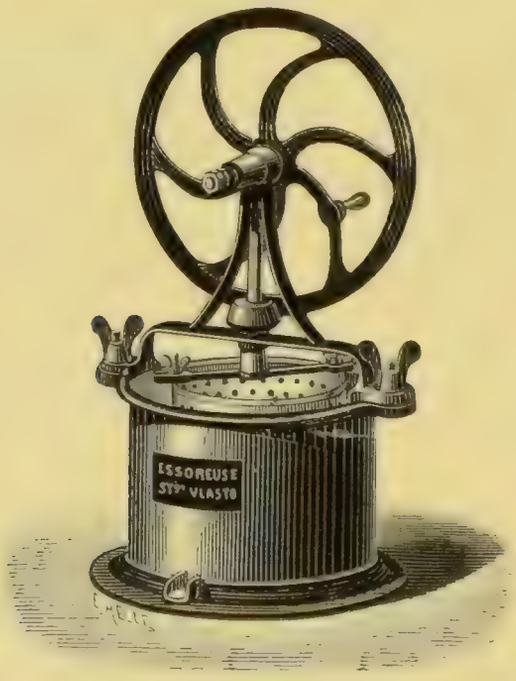
2486L **Holders,** for above Lamps, simple form ... each £0 1 6

2486M „ improved form, with Switch ... „ 0 2 6

2486N **Switches,** mounted on Porcelain, with Porcelain Key, for Lamps ... ... 5 ampères 0 2 9

... ... 10 „ 0 3 0

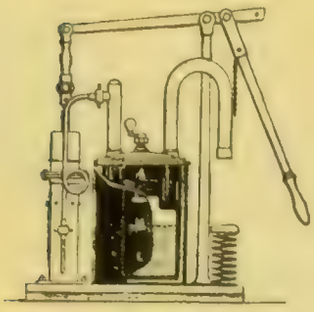
2486O **The Improved Switch,** which enables the light to be turned on from either side 0 5 0



2487

2487 **Vlasto's Practical Hydro Extractor.** A simple Apparatus for drying Chemicals which cannot be either dried or pressed by ordinary means. The Apparatus is light and of simple construction, and cannot be easily damaged. The Bucket is of Enamelled Iron, the Basket China or Enamelled Tin, and is therefore specially adapted for drying acids or alkalies; it will also be found very useful in pharmaceutical laboratories or sugar factories ... £3 5 0

A

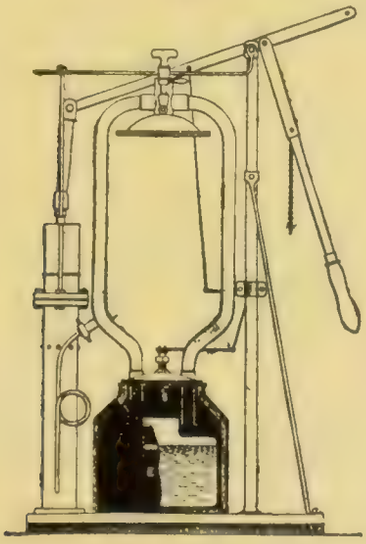


2488

2488 **Fleuss' Patent Hand Ice Making Machine,** pattern A, is very portable, simple, and compact. It is especially suitable for yachts and the camp. It will ice drinking water or still wines, and by means of the Jar and Cover (15/ extra) block ice and ice creams can be made and the butter iced for table. An attachment for icing bottled wines, beer, &c., 12/ extra; Ice Cream Jar 6/ extra. Height 24 × 16 × 11 in. £10 10 0

Weight, packed for shipment, about 112 lbs.

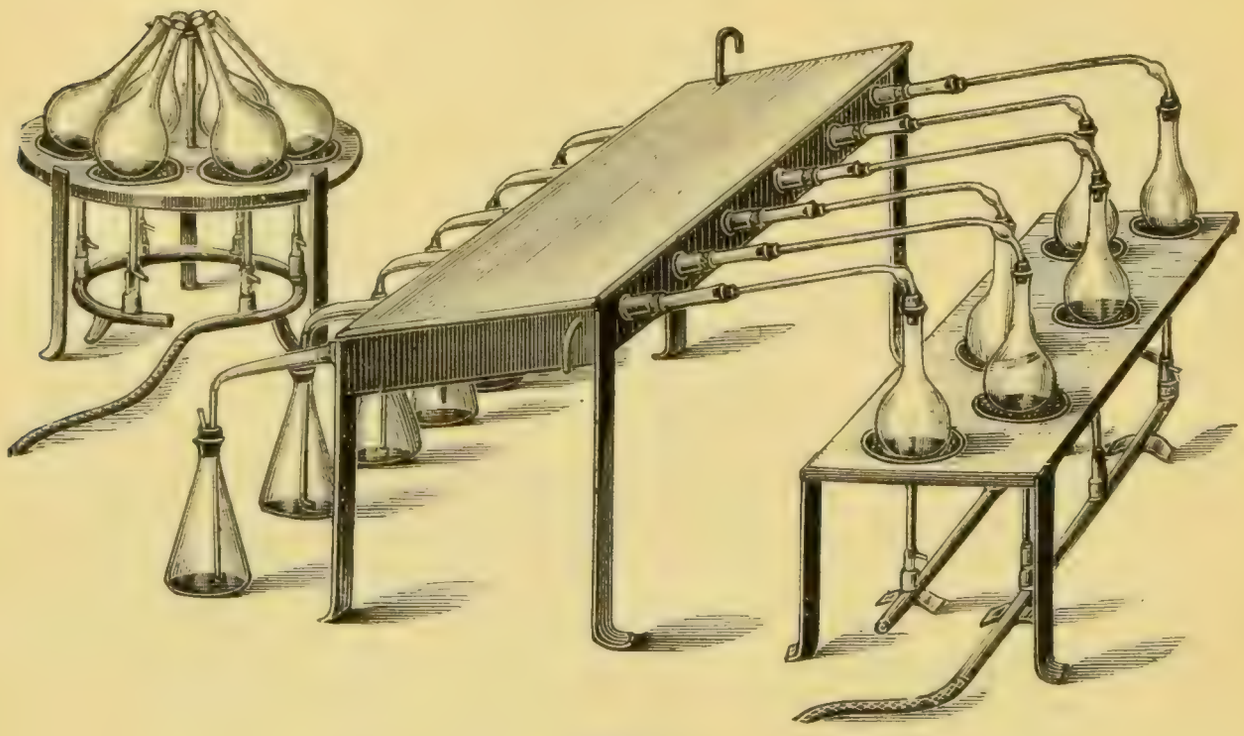
B



2489

2489 **Fleuss' Patent Hand Ice Making Machine,** pattern B, is the most suitable for export, hot climates, and domestic use. It will ice drinking water, butter for the table, and make ice creams, or block ice. The Absorber is made to contain about 5 quarts of Sulphuric Acid. Height 37 × 22 × 12½ in. £15 0 0

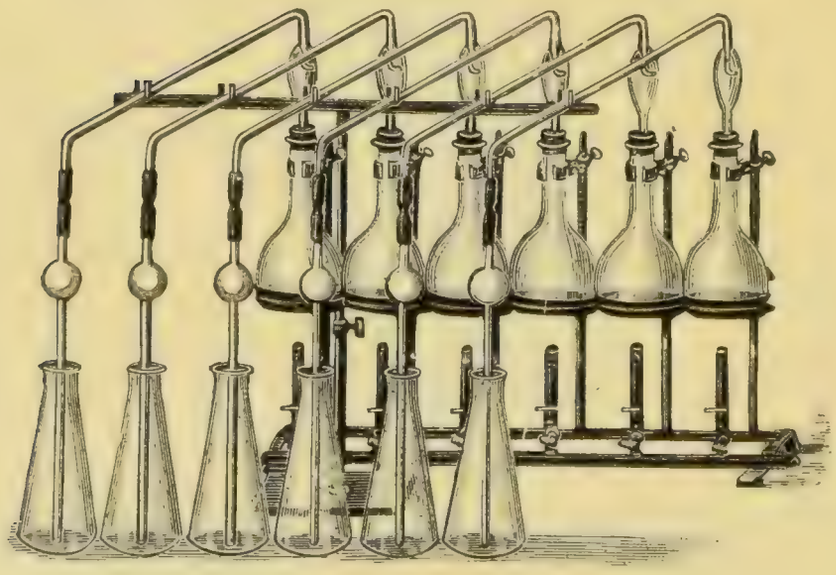
Weight, packed for shipment, 150 lbs.



2489A

2489A **Kjeldahl's Apparatus,** for the determination of Nitrogen in soils—

For 3	4	6 tests
60/	84/	115/ per set



2489B

2489B **Kjeldahl's Apparatus,** improved form—

For 3	4	6 tests
50/	70/	95/ per set

CATALOGUE OF CHEMICAL AND PHYSICAL APPARATUS

AS USED AND RECOMMENDED BY

THE SCIENCE AND ART DEPARTMENT.

Department Number.	SUBJECTS VI. & VII. THEORETICAL AND APPLIED MECHANICS.	Townson and Mercer's Catalogue Number.	Price. £	s.	d.
300	Set Mechanical Powers	2444	5	0	0
302	8 Diagrams of the Mechanical Powers, by Dr. J. Anderson ... mounted...	...	2	5	0
	unmounted	...	1	2	6
304	Model, to illustrate action of "Skew Bevils"...	2464	1	1	0
305	Pair of Ellipses	2465	0	15	0
306	Set of 3 Elliptic and Toothed Wheels ...	2466	1	7	6
307	Mangle Wheel, reciprocating motion ...	2467	0	18	6
308	Reciprocating motion by a Double Rack and Segmental Teeth	2468	0	18	6
309	2 Spur Wheels of Wood	2469	1	0	0
310	Model of Conical-toothed Wheel	2470	1	7	6
311	Odontograph in Brass	2471	1	5	0
312	Heart-shaped Cam in action	2474B	1	3	6
314	Eccentric Pin and Slit Bar	2472	1	10	0
319	Screw, returning into itself	2473	0	15	0
320	Quick return motion	2474A	1	2	6
321	Reciprocating motion by a Triple Toothed Wheel	2474	0	12	6
322	Model, to illustrate various conditions of Wrapping Contact	2475	1	15	0
330	Rod, reciprocating by means of an Eccentric Pin and Link (Booth's motion) ...	2476	2	0	0
	Most of the Apparatus in Department List not mentioned here can be supplied.				

Department Number.	SUBJECT VIII. **SOUND.**	Townson and Mercer's Catalogue Number.	Price. £	s.	d.
	APPARATUS FOR THE ELEMENTARY STAGE.				
1	Air Pump	1752	3	7	6
2	Alarum	1761	0	5	0
3	India Rubber Tubing, 36 ft.	1532	0	15	0
4	Wooden Trough, Glass Front, 48 × 6 × 6 in. ...	2022	0	12	0
5	Round Zinc Trough, 24 × 18 in.	2023	0	16	0
6	,, ,, ,, 18 × 18 in.	2024	0	12	0
7	Zinc Trough, 24 × 12 × 18 in.	2025	0	18	6
8	Wooden Block, with Handle, $5\frac{3}{4} \times 4 \times 4$ in. ...	2026	0	1	6
9	Box, for showing Vortex Rings	2006	0	6	6
10	Boyle's Tube on Board, with Scale ...	1818A	0	5	0
11	Fire Syringe	1904	0	5	6
12	2 Tuning Forks in unison	...	0	8	0
13	1 ditto, an octave higher	...	0	4	0
14	Deal Rod, 12 ft. × 1 × 1 in., uncovered ...	2036	0	1	9
15	,, 12 ft. × 1 × $\frac{1}{2}$ in.	2037	0	1	4
16	Deal Sounding Board, 24 in. square ...	2035	0	3	6
17	2 Tin Tubes, 36 × 4 in.	2042	0	7	0
18	Handbell	...	0	5	0
19	Humming Top, fitted with Brass Plate pierced with 2 rows of holes	2018	0	5	6
20	Iron Table, Vice, and Cork-lined Clamp ...	...	0	7	0
20A	Square Plate of Glass or Brass	..	3/6 & 5/6		
21	Violin Bow	...	0	4	0
22	Monochord and 2 Sets of Brass and Steel Wires	2032	0	17	6
23	Set of Weights, 3 of 10 lbs. and 1 of 20 lbs....	2034	0	14	6
24	2 Round Deal Rods, 6 ft. × $\frac{1}{2}$ in.	2038	0	2	0
25	2 ,, Oak ,, 6 ft. × $\frac{1}{2}$ in.	2039	0	2	8
26	Brass Tube, 3 ft. × $\frac{1}{2}$ in.	2040	0	1	6
	APPARATUS FOR THE ADVANCED STAGE.				
27	Pair of Telephone Models	...		...	
28	Hopkin's Forked Tube	2015	0	6	0
29	Organ Pipe, for illustrating Nodes ...	2010	1	18	6
30	Syren, with Indicator	2041	2	10	0
30A	Savart's Wheel	2020	2	10	0
31	Speaking Trumpet	2053	0	3	0
32	Manometric Flame Apparatus	2019	0	17	6
33	Chladni's Plates	2028	0	10	0
34	Sensitive Burners	...	0	10	0

Department Number.	LIGHT.	Townson and Mercer's Catalogue Number.	Price. £	s.	d.
	Apparatus for the Elementary Stage.				
40	Phosphorescence Tube	...	0	2	6
41	Lantern	1986A	4	4	0
42	2 Gas Bags, with Taps	801	4	10	0
43	Set of Lenses	1959	0	18	6
44	Frame for holding Lenses	1961A & B	0	5	6
45	2 Concave Mirrors, Glass, 9 in.	1953	0	14	6
46	2 Convex ,, ,, ,, ...	1954	0	16	6
47	2 Wedge-shaped Cells	1950	0	8	6
48	2 Flat Glass Cells	1949	0	5	6
49	Model of Eye, by Bock	1970A	0	14	6
50	Newton's Colour Disc, with Spinning Top ...	...	0	5	0
51	Semicircular Tray, 24 in. diam., 4 in. deep, with Glass Window	1997	0	8	6
52	Glass Trough, 5 divisions	1951	0	7	0
53	Carbon Disulphide Prism	1975	0	9	6
54	Prisms : Triangular 7/6, Right-angled 1 in. 7/6, Obtuse 4/6 ; Nicol's Prism 7/6 ...	...	1	7	0
55	2 Ground Glass Globes	...	0	2	0
56	8 Coloured Glass Slips, 6 in. square ...	269	0	3	4
57	Blackened Glass	...	0	1	0
58	Model of Sextant	1983	0	6	0
58	Model of Reflecting Circle	1983B	0	6	0
	Apparatus for the Advanced Stage.				
60	Polariscope, Norremberg's	1963	1	5	0
61	Plates of Quartz, Aragonite, Calcite, Selenite, and Nitre ... ... from	1984	1	1	0
62	Muller's Reflection Apparatus (Model) ...	...	0	10	6
63	Table Spectroscope (page 178)	1989	5	0	0
64	Camera Lucida	1948A	1	5	0
65	Camera Obscura	1947	0	12	6
66	Photometer	1965	2	15	0
67	Stereoscope, with Slides	1969	0	10	6
68	Apparatus, to show Newton's Rings ...	1962	0	10	6
69	2 Rhombs of Iceland Spar	1985	1	10	0
70	Tourmaline Pincette	1995	0	17	6
71	Obtuse Angle Prism	1980	0	4	6
72	Indigo Prism	1996	0	3	9
73	Grove's or Bunsen's Battery (4 Cells) ...	2236	1	15	0

Department Number.	HEAT.	Townson and Mercer's Catalogue Number.	Price. £	s.	d.
	APPARATUS FOR THE ELEMENTARY STAGE.				
80	Cryophorus	1925	0	2	6
81	Water Hammer	1921	0	1	6
82	Differential Thermometer	1493	0	4	0
83	Thermometer	1476	0	3	0
84	Unequal Expansion Bar	1894A	0	2	0
85	Contraction Apparatus with Bars... ...	1886	0	8	0
86	Metal Bar and Gauge to show expansion ...	1906	0	5	0
87	Gravesande's Ball	1909	0	3	3
88	2 Concave Tin Reflectors, 15 in. diam. ...	1938	1	1	0
89	Set of Iron Balls, 4 lbs. to $\frac{1}{4}$ lb., with Ring Handles	1891	0	5	6
90	Iron Stand for above	1892	0	1	3
91	Copper Ball, 5 lbs., with Ring Handle ...	1890	0	9	0
92	Set of Cylinders: Copper, Tin, Lead, Iron, Zinc, Bismuth, Cork, and Wood ...	1893	0	7	6
93	Regnault's Hygrometer	1897A	0	5	6
94	Leslie's Cube	1916	0	1	6
95	3 Thermometer Tubes, filled	1496	0	1	6
96	3 Barometer Tubes	1884	0	2	3
	APPARATUS FOR THE ADVANCED STAGE.				
100	Thermopile (20 pairs)	1931	1	5	0
101	Galvanometer	2333	2	0	0
102	Radiometer	1993	0	4	9
103	Apparatus, for showing absolute expansion of Liquids	1888	1	0	0
104	Liquid Conductivity Cones	...	0	2	6
105	Ferguson's Pyrometer	1903	1	12	6
106	Mercury Trough	1133	0	1	6
107	Safety Lamp	1899	0	8	6
108	Balance	...	10/6, 21/ or £1/11/6		
109	Set of Weights, 100 grammes to ·01 ...	161	0	8	4
110	Do. gramme, or 1,000 grains to $\frac{1}{10}$th grain ...	161	0	7	6

APPARATUS AND MATERIALS FOR TEACHING THE ELEMENTS OF MAGNETISM AND ELECTRICITY.

Department Number.	SUBJECT IX.	Townson and Mercer's Catalogue Number.	Price.
	MAGNETISM.		
	Apparatus for the Elementary Stage.		£ s. d.
1	Piece of Magnetic Iron Ore	...	0 4 0
2	Magnetic Needle, on Vertical Pivot ...	2350	0 3 6
3	Dipping Needle	2355	0 7 6
4	Pair of Bar Magnets...	2344	0 2 6
5	Horseshoe Magnet	2343	0 1 6
6	Iron and Steel Filings	...	6d. per lb.
7	Pieces of Soft Iron	...	0 1 0
8	Knitting Needles	...	0 0 6
9	Compass Card	...	0 0 6
	Apparatus for the Advanced Stage.		
11	Astatic Needle	2352	0 7 6
12	Large Electro-magnet	2342	0 17 6
13	Bars of Antimony, Bismuth, and Nickel ...	2276	0 4 3
	FRICTIONAL ELECTRICITY.		
	Apparatus for the Elementary Stage.		
20	Electrical Glass Tube, rounded ends ...	...	0 2 0
21	Fur and Silk Rubbers	2099A & C	0 2 6
22	Stick of Shellac, 10 by 1 in.	2179	0 1 6
23	Stick of Sulphur, mounted in Wood Handle ...	2180	0 2 6
24	Stick of Sealing Wax, 10 by 1 in. ...	2178	0 1 6
25	Brass Tube or Rod, with rounded ends ...	2177	0 2 0
26 26A	Electrical Machine, Plate, Cylinder, or Electrical Machine (Wimshurst's)	2055–2058 2077A	...
27	Amalgam	...	6d. per oz.
28	Electroscope	2124	0 7 6
29	4 two-pint Leyden Jars, in Tray	2154	1 5 0
30	Leyden Jar, with Moveable Coating ...	2156	0 6 0
31	Discharger	2114	0 6 0
32	Sheet of Caoutchouc	...	0 2 0
33	Electrophorus	2129	0 9 6
34	Pith Ball Electrometer	2117	0 1 3
35	Insulating Stand	2189	0 5 0
36	3 Conductors, Cone, Cylinder, and Ball to fit on Stand	2105B	0 7 6
37	Roll of Tinfoil on Glass Tube	2193A	0 1 0
38	Fulminating Pane, with Silk Handles ...	2138	0 4 0
39	Electric Whirl	2195	0 2 6

Department Number.	FRICTIONAL ELECTRICITY, *Continued.*	Townson and Mercer's Catalogue Number.	Price.
	APPARATUS FOR THE ADVANCED STAGE.		£ s. d.
41	Bohnenberger's Electrometer	2128A	2 15 0
42	Electrical Machine (Voss' or Wimshurst's) ...	2072-2087	...
43	Thompson's Quadrant Electrometer ...	2120	6 0 0
44	Henley's Universal Discharger	2116A	0 18 6
45	Faraday's Butterfly Net	2134A	0 4 6
46	Coulomb's Torsion Balance	2119	3 15 0
47	Aurora Flask	2089	0 7 6
48	Bucket and Syphon	2098	0 3 6
49	Unit Jar	2139	0 16 0

Department Number.	VOLTAIC ELECTRICITY.	Townson and Mercer's Catalogue Number.	Price.
	APPARATUS FOR THE ELEMENTARY STAGE.		£ s. d.
51	Strips of Copper and Zinc	...	0 1 0
52	Daniell's Cell	2234	4/6 & 6/
53	Smee's Cell	2241	0 5 9
54	One Metal Cell	...	..
55	Bunsen's Battery	2232	3/8 & 5/
	,, ,, ...	2233A	3 0 0
	Grove's ,, ...	2236	1 15 0
56	Copper Covered Wire, Cotton (No. 18) ...	2374	1/10 per lb.
57	,, ,, ,, Silk (No. 20) ...	2377	5 6 ,,
58	,, ,, ,, Guttapercha ...	2379	1½d. per yd.
59	Oersted's Experiment	2356	0 3 6
60	Floating Battery	2244	0 3 9
61	Electro Magnet	2340	0 7 0
62	Electrolysis Apparatus	(2310	8/6 & 10/
		(2311	1 5 0
63	Pair of flat Spirals, on Boards	2363	0 5 0
64	Galvanometer	(2324	0 7 0
		(2326	0 12 6
65	Model of Single Needle Telegraph ...	2319	0 15 0
66	Induction Coil, $\frac{9}{16}$ in. Spark	2299	1 10 0
67	Mercury (price varies)	...	2/6 per lb. and upwards

VOLTAIC ELECTRICITY,

Continued.

Apparatus for the Advanced Stage.

Department Number.		Townson and Mercer's Catalogue Number.	Price. £	s.	d.
71	Bichromate Battery, 1 litre	2229	0	5	0
72	Leclanche Battery	2239	0	1	9
73	Electric Bell	2203	0	4	9
74	Wheatstone's Bridge	2358	2	2	0
75	Set of Resistance Coils	2357A	4	15	0
76	Commutator	2307	0	10	6
77	Tangent Galvanometer	2327	1	15	0
78	Chain of Alternate Links, Silver and Platinum	2279	5/6 & 9/		
79	Apparatus to show Current produced in a Copper Disc, rotating between the Poles of a Magnet	2273	2	0	0
80	Barlow's Wheel	2274	0	10	0
81	Magneto-electric Machine	2347	1	8	6
82	Thermo-electric Pair...	2364	0	8	6
83	Secondary Battery	2397	0	13	6
84	Electric Lamp	2317	2	0	0
85	Astatic Galvanometer	2332 2334A	1 3	7 10	6 0
86	Reflecting Galvanometer	2330	6	6	0
87	Rheostat	2359	2	10	0

SUBJECT X.

INORGANIC CHEMISTRY.

Department Number.		Townson and Mercer's Catalogue Number.	Price. £	s.	d.
4	Spirit Lamp	967	0	0	9
1	Bunsen Burner, with Rose Top and Blowpipe Jet	989 990 993	0	2	3
2	Bunsen Burner, with Spreading Flame ...	695	0	7	0
	Mouth Blowpipe	231	0	0	6
7	Crucible Tongs	1504	0	1	0
8	Platinum Foil and Wire	...	0	6	0
9	Iron Spoon	1263	0	0	3
10	2 Retort Stands, with 3 Rings and Clamps...	1310 1324	0	13	0
12	Iron Tripod	1361	0	0	9
13	Sand Bath	1205	0	0	3
14	2 Pieces Wire Gauze	1696	0	0	6
49	Test Tube Brush	1434	0	0	2

Department Number.	INORGANIC CHEMISTRY, *Continued.*	Townson and Mercer's Catalogue Number.	Price. £	s.	d.
15	Pipe Clay Triangle	1528	0	0	2
56	Steel Spatula	1226	0	0	8
61	1 each Round and Triangular Files in Handles	552, 553	0	1	0
60	Set (6) Cork Borers	401	0	2	6
	2 Clips : 1 Spring, 1 Screw	376, 380	0	1	0
57	4 Pieces Rubber Tubing	1532	0	4	9
59	30 India Rubber Corks, with 2 Holes ...	400	0	9	0
33	Pneumatic Trough	1127	0	3	9
31	Deflagrating Spoon and Cap	783	0	0	9
64	Mortar and Pestle	1089	0	1	5
	2 China Basins	...	0	2	0
	2 China Plates	...	0	1	0
6	Porcelain Crucible and Cover	413	0	0	6
55	Porcelain Evaporating Basin	186	0	0	6
	Glass Stirring Rod	...	0	0	2
41	18 Pieces Glass Tubing, assorted... ...	...	0	1	6
	Glass Bulb with Long Neck	...	0	1	0
44	Hard Glass Tube with Bulb for Reduction ...	1557	0	0	6
	Calcium Chloride Tube	1544	0	0	2
	2 U Tubes	1539	0	0	10
	2 Glass Tumblers	...	0	0	8
110	Aspirator with Tubulure	337	0	1	6
	Glass Crystallizing Dish	204	0	0	8
23	3 Gas Cylinders	724	0	1	9
29	5 Wide-mouth Bottles for Gases, stoppered...	...	0	7	6
30	Glass Bell Jar, stoppered	710	0	2	0
26	6 Ground Glass Plates	408	0	0	8
	Soda Water Bottle	...	0	0	2
51	Funnel	639	0	0	6
52	2 Packets Filter Papers	567	0	1	2
39	2 Thistle Funnels	650	0	0	5
22	8 Boiling Flasks	587A, 588	0	3	6
54	Set Lipped Beakers	214	0	2	0
53	2 Clock Glasses	412	0	0	6
53	2 Watch Glasses	1687	0	0	5
48	Test Tube Stand with 12 Holes and Pegs ...	1447	0	1	10
45	4 Boiling Tubes	1430	0	0	6
46	12 Test Tubes	1426	0	0	8
16	3 Retorts, stoppered	1171	0	2	0
70	Pair Scales, mounted on Stand, with 17 Weights	...	0	10	6
			0	2	6
71	Measures and Weights of Metric System ...	...	0	15	0

Department Number.	INORGANIC CHEMISTRY. *Continued.*	Townson and Mercer's Catalogue Number.	Price. £	s.	d.
66	*Grove's Battery of 5 Cells, in Mahogany Tray as Fig. 2236	2236	2	2	6
	Ruhmkoff's Induction Coil	2298	1	0	0
	Apparatus to show that there is no destruction of matter when Candle burns ...	...	0	1	9
	Apparatus for burning Air in atmosphere of Coal Gas	...	0	1	0
	Globular Flask for showing Air has Weight ...	...	0	2	6
	Horseshoe Magnet with Tin Tray to suspend from Beam of Balance	...	0	1	6
67	Apparatus for Electrolysis of Water and Hydrochloric Acid with Platinum and Carbon Poles on Iron Stand	1630 1631 1627	1	5	0
	Apparatus for generating Ozone, mounted on Mahogany Stand	1538	0	10	6
	8 Blocks to illustrate combination in multiple proportion	...	0	7	0
	Apparatus for preparing Nitric Peroxide from Air...	1637	0	5	6
	Clay Tobacco Pipe with long Stem ...	...	0	0	4

* This is a Special Set for Science and Art Department.

SUBJECT X.

INORGANIC CHEMISTRY.

Each Bench must be furnished with the following Apparatus and Chemicals, as recommended by the Science and Art Department—

Bunsen Gas Burner, with Blowpipe Jet and Rose Burner
Test Tube Stand
24 Test Tubes
Mouth Blowpipe
Piece Iron Wire Gauze
6 inches Platinum Wire
Piece Platinum Foil
Set 3 Beakers
Wash Bottle fitted I. R. Corks
Book Blue Litmus Paper
Retort Stand with 2 Rings
Tripod Stand
Sand Bath
Crucible Tongs
Spatula
2 Flasks
Porcelain Crucible
2 Porcelain Basins
2 Funnels
Packet Filter Papers
Triangular and Rat-tail Files in Handles

Price of the above Set 15/

REAGENTS.

Solutions in 6 oz. Well-stoppered Bottles; Solids in 2 oz. Wide Mouth Stoppered Bottles.

Sodium Hydrate
,, Phosphate
,, Carbonate
Potassium Ferrocyanide
Ammonium Oxalate
,, Chloride
,, Carbonate
,, Sulphide
,, Hydrate
Barium Chloride
Calcium Sulphate
Silver Nitrate
Lead Acetate
Sulphuric Acid, concentrated
,, ,, dilute
Nitric Acid, dilute
Hydrochloric Acid, dilute
Sulphuretted Hydrogen, solution
Lime Water
Borax
Fusion Mixture
Ferrous Sulphate, cryst.
Manganese Dioxide
Potassium Nitrate
Lime, powder

Price of the above Reagents 15/

APPARATUS AND REAGENTS FOR GENERAL USE.

A stock of the following Apparatus must be kept for the supply of the Students—

Test Tubes
Boiling Tubes
Soft Glass Tubing
Combustion Tubing
Glass Rod
Thistle Funnels
Corks, assorted
I. R. Tubing
Evaporating Basins
Glass Retorts, Stoppered (assorted)
Beakers (assorted)
Flasks (assorted)
Gas Jars
Mortars and Pestles, Stoneware
Iron Mortar and Pestle
Cork Borers
Furnace for Gas or Charcoal
Liebig's Condenser
Sulphuretted Hydrogen Apparatus.

The cost of the above depends upon the number of Students in the Class.

One or more Sets of the following Reagents will also be required for general use. Solutions in 12 oz. Narrow Mouth, and Solids in 2 oz. Wide Mouth Bottles—

Sodium Hypochlorite, solution
Potassium Ferricyanide
,, Chromate
,, Iodide
,, Sulpho-cyanide
Ammonium Acetate
,, Molybdate
,, Sulphate
Mercuric Chloride
Platinic Chloride, solution
Magnesium Sulphate
Stannous Chloride
Calcium Chloride
Cobalt Nitrate, solution
Ferric Chloride
Acetic Acid
Tartaric Acid
Nitric Acid, concentrated
Hydrochloric Acid, concentrated
Sulphurous Acid, solution
Barium Hydrate
Alcohol
Ether
Hydric Potassic Sulphate
Potassium Cyanide
,, Chlorate
Starch
Microcosmic Salt
Methylated Spirit
Charcoal
Copper Oxide
Soda Lime

Price of the above Reagents £1 10/

Where there are Students who intend to take Honours in the examination in Practical Chemistry, the following Set of Apparatus at least must be provided for every six Students—

2 Drying Ovens	each 12/6, 21/, 25/,	£1	16 0
A Water Bath	...each 6/, 8/,	0	12 6
An Agate Mortar, 3 in. ...	... ...	0	12 0
A Balance, turning with $\frac{1}{100}$th grain	each 130/, 175/,	12	10 0
A Platinum Dish	... about	2	0 0
A Platinum Crucible	... about	1	10 0

SUBJECT XII.

GEOLOGY.

Geological Map of the British Isles ...	15/, 32/,	£2	2 0
,, 1 in. of the district, Coloured, per sheet	1/6 and	0	2 6
Collection of Fossils, price depending on size and number of specimens.			

Department Number.	SUBJECT XXII. STEAM.	Townson and Mercer's Catalogue Number.	Price. £	s.	d.
450	Collapsing Tin Cylinders, to show pressure of Steam	1917	0	0	6
451	Mariotte's Apparatus to illustrate Boyle's law	1817	0	12	0
452	Barometer Tube and Trough for experiments on vapour pressure	...	0	1	4
453	Mercury for above, 8 lbs.	...	2	6 per lb.	
454	Marcet's Boiler for experiments on high pressure	1918	3	3	0
455	Apparatus for experiments on latent heat of Steam	...	0	5	0
456	Air Thermometer	1929	0	3	6

SUBJECT XXIII.

PHYSIOGRAPHY.

Maximum Thermometer	3/6 and	£0	5 6
Minimum ,, ...	2/ and	0	3 6
Black Bulb ,, ...	3/6, 12/6 and	1	1 0
Rain Gauge	...	0	7 6
Barometer	17/6 to	3	3 0
Ordnance Survey of district, showing contour lines	per sheet 1/6 and	0	2 6
Terrestrial Globes	per pair	3	15 6
,, ,, ...	each	2	2 0
Geological Map of the British Isles ...	15/, 32/,	2	2 0

CHEAP SETS.

THE CHEAP STÖCKHARDT'S CHEMICAL SETS.

Arranged according to the Directions of PROFESSOR STÖCKHARDT.

FIRST SET, 16s. Packed in a Case, 17s.

1 Holder for Retorts, Tubes or Flasks
2 Hard Glass Retorts, 4 oz. and 12 oz. capacity
2 Hard Glass Receivers, 4 oz. and 12 oz. capacity
1 Spirit Lamp, 2 oz. capacity
2 Hard Glass Flasks for boiling, 4 oz. and 8 oz. capacity
1 Hard Glass Flask with Jet for washing precipitates, 12 oz. capacity, or for burning Hydrogen as generated, or as Marsh's Arsenic Apparatus
2 Gas Cylinders with Ground Edges
2 Ground Glass Plates for the Cylinders
3 Bottles to hold gases
1 Hard Glass Tube for preparing Oxygen
1 Test Tube Stand, with 12 holes
12 Test Tubes, 5 in. × $\frac{5}{8}$ in.
1 Test Tube Cleaner
2 Analytical Glass Funnels for Filters
1 Brass Blowpipe
1 Tripod to support a Sand Bath or Flask for digestion, or Retort for distillation
2 Wire Triangles for Tripod
2 Iron Dishes for Sand Baths, 4 in. and 6 in. diameter
3 Porcelain Evaporating Dishes, 2½ in., 3½ in., and 4½ in. diameter
2 Porcelain Crucibles and Covers, ½ oz. and 1 oz. capacity
3 Hessian Crucibles, ½ oz., 1 oz., and 2 oz. capacity
1 Mortar and Pestle
3 Cork Borers for perforating Corks
12 Assorted Corks for Flasks, Tubes, &c.
1 Round File for enlarging holes in Corks
1 Triangular File for cutting Glass Tubing
1 Piece of Wire Gauze
1 Ditto of Platinum Foil
1 Ditto of Platinum Wire
1 Ditto of Copper and Zinc, united for galvanic depositions
1 Iron Spoon for Fusions
2 Glass Stirring Rods
3 Tubes for the reduction of Arsenic according to the forms of Berzelius, Clark and Rose
2 Bent Leading Tubes for fitting up Flasks, &c., for preparing Oxygen, Hydrogen, and other gases
A Piece of Wood Charcoal for Blowpipe
½ lb. Glass Tubing, assorted

SECOND SET, 25s. Packed in a Case, 26s.

Includes the First Set, with the Extra Apparatus undermentioned.

1 Stoppered Hard Glass Retort, 4 oz. capacity
1 Hard Glass Flask, 16 oz. capacity
1 Pipette or Dropping Tube
1 Woulffe's Bottle with 3 Necks for washing gases, &c.
1 Spoon with Cap, for Charcoal, Sulphur, &c., when deflagrated in Oxygen
3 Bohemian Beaker Glasses for hot solutions, 4 oz., 6 oz., and 10 oz. capacity
1 Metal Spirit Lamp, with double current, and Arms to support Sand Bath, Dishes, Crucibles, with Hot Plate and 2 Rings

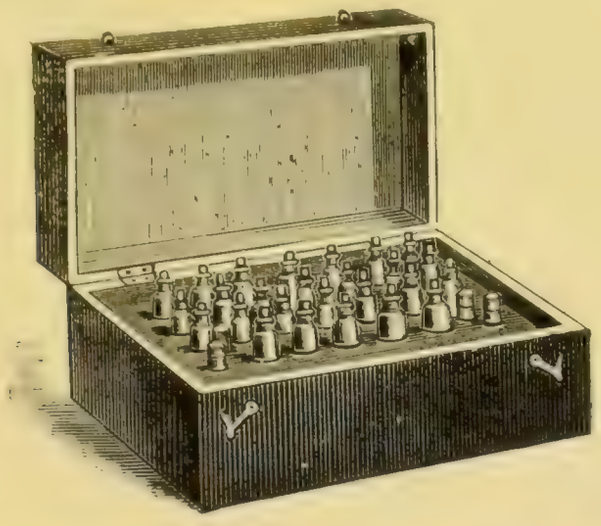
Where Gas is obtainable a Bunsen's Gas Lamp with Arms and Rings may be substituted for the Spirit Lamp above mentioned.

1 Thistle-headed Glass Safety Funnel to introduce acid in the preparation of gases
1 Chloride of Calcium Tube for drying gases
1 Berzelius' Blowpipe, with moveable Platinum Jet, to prevent oxidation (*instead of Brass Blowpipe as contained in former Set*)
1 Pair of Crucible Tongs
Book containing upwards of 400 Reagent Labels, gummed, with symbols

THIRD SET, 50s. Packed in a Case, 52s.

Includes the Second Set, with the following additions.

1 Box of Scales and Weights, with Glass Pans
1 Graduated 2 oz. Glass Measure
1 Gas Receiver, 20 oz. capacity, with Brass Cap, Stopcock, Bladder Ferrule and Jet, USEED for holding or conveying gases into Bladders, Balloons, &c.
1 Pneumatic Trough, 1 gall.
1 Thermometer, graduated on Stem to 400° Fahr., to pass through Corks into Flasks, &c., *in Case*
2 Hydrometers, for ascertaining the density of fluids, taking 1,000 grains of distilled water at 60° Fahr. as standard, one for fluids lighter than water, as Spirits, &c., 700° to 1,000°, one for heavier fluids, 1,000° to 1,850°
1 Solution Tube, for holding the fluids for Hydrometer during immersion
1 Graduated Test Measure, 1,000 grains, in 100 divisions



SET OF STÖCKHARDT'S REAGENTS, 21s.

A Test Cabinet, Polished Teak, containing the following pure Reagents in closely Stoppered Bottles, from which Testing Solutions may be made.

Potassium Antimoniate
Peroxide of Mercury
Solution of Chloride of Gold
Solution of Chloride of Platinum
Solution of Nitrate of Silver
Solution of Nitrate of Cobalt
Indigo Sulphate
Ammonia Solution
Potassium Ferrocyanide
Tin Protochloride
Lead Acetate
Iron Sulphate
Iron Sulphide
Ammonium Sulphide
Ammonium Oxalate
Dried Borax
Ammonium Carbonate
Barium Chloride
Calcium Hydrate
Calcium Sulphate
Sodium Phosphate
Sodium Carbonate
Sodium and Ammonium Phosphate
Potassium Hydrate
Potassium Chromate
Tincture of Nutgalls
Granulated Zinc
Ammonium Chloride
Oxalic Acid
Tartaric Acid
Hydrochloric Acid
Sulphuric Acid
Nitric Acid
Test Papers for Alkalies and Acids

A Polished Teak Case, with Hinges, Lock, and Key, Divisions for Bottles, &c., substantially made for any climate, containing the Third Set and Reagents Price £5 ; an Outer Packing Case, 2/6 extra

THE CHEAP ANALYTICAL SET, FOR TEACHERS. Packed, £2 8s. 6d.

Conical Brass Blowpipe, with Bone Mouthpiece
6 inches Platinum Wire
Platinum Foil, 2 in. × 1 in.
Test Tube Stand, 24 holes
18 Test Tubes 6 in. × ¾ in., and 12 5 in. × ½ in.
2 Boiling Tubes, 8 in. × 1½ in.
2 Test Tube Brushes
Set of Beakers
German Flasks, 1 each—2, 4, 8, 30 oz. capacity
Berlin Porcelain Crucible, 1¼ in. diameter
Berlin Porcelain Evaporating Basins, 1 each —2¾ in. and 3½ in. diameter
English Filter Paper, 2 packets of 100, each —2¾ in. and 3½ in. diameter
Iron Retort Stand, with 2 Rings and Clamp
Iron Wire Gauze, 6 in. square, 2 pieces
Tinplate Sand Bath, 5 in. diameter
6 Watch Glasses, 2 in. diameter
½ lb. each, soft Glass Tube ¼ in. diameter, and Combustion Tube ⅜ in. diameter
¼ lb. Glass Rod, $\frac{3}{16}$ in. diameter
4 ft. Black Caoutchouc Tube, ⅜ in. bore; 2 ft. ditto ⅛ in. bore
2 Thistle Funnels
3 doz. assorted Corks
Stoppered German Glass Retort, 2 oz. capacity
Set of 3 Cork Borers, with Iron Rod
1 each Triangular and Round Files, in Handles
Bunsen's Gas Burner, with Blowpipe Jet, Star Support, Chimney, and Rose Burner
Iron Crucible Tongs
4 in. Porcelain Mortar and Pestle
Box of Test Papers, Blue and Red Litmus
Solutions in ½ oz. Stoppered Bottles
,, Argentic Nitrate ,,
,, Platinic Chloride ,,
Test Tube Basket
3 Funnels 2½ in., and one 3 in.
Funnel Stand, Blackwood
1 pair Scissors
Steel Spatula, 5 in.
2 Dusters

For this Set "Valentin's Chemistry" is most suitable.

Set of Apparatus for Quantitative Analysis includes the above with the following additions.

Platinum Crucible
Platinum Basin
Platinum Wire, 12 inches
2 Weighing Tubes
1 Packet Swedish Filter Paper

The cost depending on the price of Platinum.

A CHEAP LECTURE SET FOR EXPERIMENTS WITH THE GASES, 40s.

Hard Glass Flask, with Safety Funnel and Leading Tube, arranged for the preparation of Hydrogen, Carbonic Acid, Chlorine Gases, &c.
Hard Glass Flask, with Leading Tube, for the preparation of Oxygen, Laughing Gas, &c.
1 Flask Holder, for the Hand
Sheet Iron Retort, for Oxygen
Japanned Tin Pneumatic Trough, with Side Shelves
Metal Spirit Lamp, with double current, and Ring to support Flasks; or where Gas is obtainable a Bunsen's Gas Lamp instead of the Spirit Lamp
1 Iron Tripod, with Sand Bath Dish
1 Gas Receiver, 1 pint capacity, fitted with Brass Cap, Stopcock, Bladder and Ferrule, and Brass Jet for burning Hydrogen
1 Taper Holder
3 Gas Receivers, 1 quart capacity, 1 plain and 2 stoppered
2 Earthenware Trays, for removing Gas Receivers from Pneumatic Trough when filled
3 Ground Glass Plate Covers, for Gas Receivers
Deflagrating Jar, 1 pint capacity, with Ground Edge, Brass Cap and Spoon, for Phosphorus, Sulphur, &c.
1 extra Deflagrating Jar
Woulffe's Bottle, with Tubes arranged for purifying gases
Strong Glass Tube, for exploding the mixture of Hydrogen and Oxygen
Iron Wire Gauze, for Davy's experiments
2 Goldbeaters' Skin Balloons, for Hydrogen
Mouthpiece, for inhaling Laughing Gas from a Bladder or Gas Bag
3 ft. Caoutchouc Tube

Packing Case for the Set, 2s.

When it is desirable to make larger quantities of Gases than the above Receivers will hold, 1 or more 4-gallon Gas Holders of Japanned Zinc, with Stopcock, at 30s. each, or Vulcanised Rubber Gas Bags, 19 in. × 17 in., at 12s. 6d., may be added to the Set.

CHEAP SET, FOR BEGINNERS, PACKED IN BOX, 10s.

Test Tube Stand, 6 holes
6 Test Tubes, 5 × ⅝ in.
1 Large Test Tube
Test Tube Cleaner
Test Tube Holder
2 Glass Flasks, 4 oz. and 8 oz. capacity
½ lb. Glass Tube for bending
Stirring Rod
Glass Funnel, 3 in.
100 Cut Filters, 4½ in. diam.
Retort Stand, with 2 Rings
Plain Retort, 4 oz. capacity
3 Bohemian Glass Beakers
Spirit Lamp
Wire Tripod
Sand Dish, 5 in. diam.
Porcelain Evaporating Basin, 3 in. diam.
Mortar and Pestle
Brass Blowpipe, Japanned Tin
Charcoal
Gas Cylinder, with ground edge, 6 in. high
Ground Glass Plate
Woulffe's Bottle
Thistle-headed Funnel
Pipette

SETS OF APPARATUS.

Arranged by Mr. WANKLYN, for the use of Medical Officers of Health, in the Analysis of Water, Milk, Tea, Coffee, and Cocoa.

WATER ANALYSIS SET.

Chemical Balance, in Glass Case
Set of Chemical Weights, 50 grammes to 1 milligramme
Liebig's Condenser, Japanned Copper Body, with Joint and Telescope Slide, on Tripod Stand
3 extra Condenser Tubes
6 Stoppered Retorts, 1 litre capacity
1 doz. Nessler Tubes, marked at 50 c.c.
Mohr's Burette, with Stopcock
Mahogany Burette Stand, with Clamp
2 Graduated Pipettes
Porcelain Evaporating Basin
4 Flasks, marked in the Neck
Iron Retort Stand, with 4 Rings
Gun-metal Clamp
Bunsen's Burner, with Regulator
4 ft. Vulcanized Rubber Tube, $\frac{5}{16}$ in.
Platinum Dish, 3 in. diam.
Chromate of Potash, in Stoppered Bottle

Complete Set, £10 10s. Packing Case, 5s. extra.

REAGENTS FOR WANKLYN'S WATER ANALYSIS.

Prepared specially, and of guaranteed accuracy.

Quick Nessler Test	10s. per litre
Standard Ammonia	5s. ,,
Permanganate Potash	10s. ,,
Standard Nitrate Silver	5s. ,,
,, Soap Test	8s. ,,

MILK ANALYSIS SET.

Chemical Balance, in Glass Case
Set of Chemical Weights, 50 grammes to 1 milligramme
Copper Water Bath, with 6 Holes and Covers
Iron Stand for ditto
6 Platinum Capsules, numbered
Marked Pipette
Flask, marked in the Neck
Bunsen's Burner, with Regulator
4 ft. Vulcanized Rubber Tube
Platinum Dish, 3 in. diam.
Methylated Ether
Alcohol
Nest Bohemian Beakers
Wood Funnel Holder
Glass Funnel
Packet Cut Filters

Complete Set, £13, depending on the price of Platinum.
Packing Case, 3s. extra.

SET OF APPARATUS AND REAGENTS,

For the Analysis of Malts, Saccharine Materials, Beers, &c.

Arranged by Dr. GRAHAM, D.Sc. (Lond.), late Professor, &c., University College, London, W.C.

Chemical Balance
Pair Glass Scale Pans for ditto
Set Chemical Weights
Taylor's Drying Oven, Japanned Tin
Retort Stand, Galvanized Iron
2 Tripod Stands
Geissler's Burette with Stopcock, 50 c.c. in $\frac{1}{10}$ths
Glass Liebig's Condenser
5 Pipettes marked to deliver specific quantities
1 Pipette Graduated, 10 c.c.
3 Berlin Porcelain Evaporating Basins
2 doz. Test Tubes, assorted
Test Tube Stand with Pegs
7 N.M. Stoppered Bottles, 8 oz. capacity
6 Do. do. 16 oz. ,,
6 each W.M. do. 8 oz. and 16 oz. do.
6 Do. do. 1 oz. capacity
5 Do. do. 2 oz. ,,
2 Tin Water Baths
5 Bohemian Flasks, assorted
4 Bohemian Funnels, assorted
4 Stoppered and Marked Flasks
4 Light Glass Evaporating Ba ins
1 Pipeclay Triangle
1 Burette Stand
1 India Rubber Cork, 2 Holes
1 lb. Glass Tubing, assorted
Metal Clamp for Retort Stand
2 Bunsen's Burners with 1 Rose Top
1 Packet Swedish Filter Paper
1 Do. English do.
12 Sheets Rhenish do.
1 Book of Tables of Original Gravities of Beer
Pair Gun-metal Crucible Tongs
Porcelain Testing Tile
Specific Gravity Bottle and Counterpoise
Thermometer Graduated on Stem
3 Sand Dishes
3 ft. Black Vulcanized Rubber Tube, assorted
12 ft. Vulcanized Gas Tubing
4 doz. Assorted Best Corks
Set of 8 Bohemian Beakers
6 Glass Stirring Rods
2 Squares Fine Wire Gauze
1 each Round and Triangular Files, with Handles
Test Tube Cleaner
1 Berlin Porcelain Crucible
4 Nessler Tubes, assorted
3 N.M. Corbyn Quarts, stoppered
1 Packet Plain Labels
Mortar and Pestle, 5 in. diam.

CHEMICALS.

Acetic Acid
Ammonia Solution
Animal Charcoal
Sulphuric Acid
Dried Carbonate of Soda, Pure
Caustic Soda
Infusion of Litmus
6 Books Test Papers, assorted
Iodine
Iron Sulphate
Copper Sulphate, Pure
Rochelle Salt
Mercury Chloride
Potassium Iodide
Do. Permanganate
Ammonium Chloride
Potash Caustic
Oxalic Acid
Alcohol Absolute
Potash Chromate
Ammonium Oxalate
Do. Carbonate
Sodium Phosphate
Barium Chloride
Hydrochloric Acid

Complete Set, £10.

With Balance in Glass Case, £1 5s. extra. Packing Case, 5s. extra.

THE CHEAP SET OF BLOWPIPE APPARATUS, 21s.

(*See page* 40.)

OXFORD LOCAL EXAMINATION SET.

Packed in Box, complete, **14/6.**

REAGENTS, SOLUTIONS IN WELL-STOPPERED BOTTLES, 2 oz., FOR ABOVE.

The Set complete, in Deal Box, **20/.**

CAMBRIDGE LOCAL EXAMINATION SET.

Packed in Box, complete, **12/6.**

SCIENCE TEACHERS' SET.

As supplied to the Royal College of Science, South Kensington.

Packed in Deal Box, **£2 10s.**

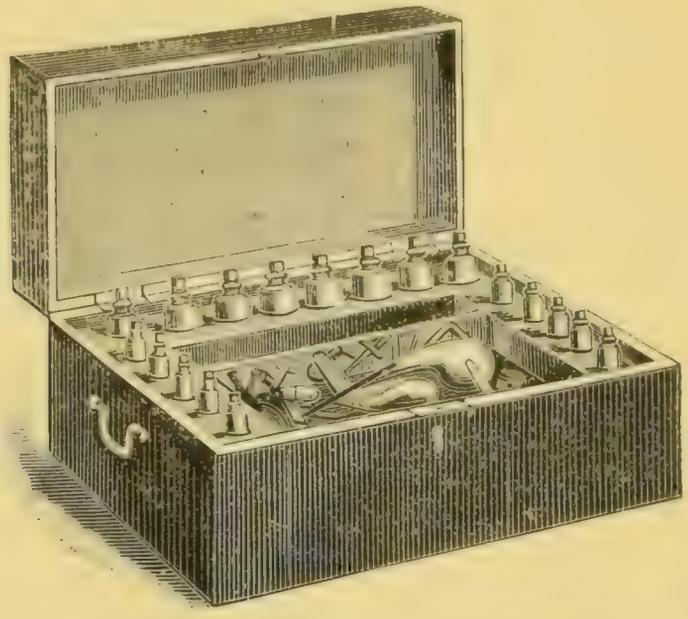
FOR MICROSCOPIC WORK.

1 Knife or Scalpel
1 pair Forceps
½ doz. Thin Glass Slips
¼ oz. Thin Covering Glasses
Camel's Hair Brush
2 Mounted Needles

Price, **5s. 6d.**

TOWNSON & MERCER'S USEFUL SET OF APPARATUS AND CHEMICALS.

Suitable for a Present or School Prize. Price, £2 2s.



Mortar and Pestle
2 Gas Cylinders
2 Glass Plates
Woulffe's Bottle
Thistle Funnel
Pipette
India Rubber Tube
Pneumatic Trough Shelf
2 Funnels
Packet Cut Filters
Berlin Crucible and Cover
Retort Stand, 3 Rings
½ lb. Glass Tube
Triangular File
2 Stirring Rods
Stoppered Retort
Receiver
Sand Dish
3 Porcelain Basins

Black's Blowpipe
Charcoal
Platinum Wire and Foil
Chloride Calcium Tube
Deflagrating Spoon and Cap
Assorted Corks
1 doz. Test Tubes
2 Boiling Tubes
Test Tube Stand
,, Holder
Box Scales and Weights
3 Boiling Flasks
Pipeclay Triangle
Set 3 Beakers
Set 3 Cork Borers
Spirit Lamp
Iron Tripod Stand
Book 500 Chemical Experiments

CHEMICALS IN STOPPERED BOTTLES.

Hydrochloric Acid
Nitric Acid
Sulphuric Acid
Ammonia
Potass. Ferrocyanide
Potass. Chlorate
Sol. Nitrate Cobalt
Sol. Nitrate Silver

Barium Chloride
Ammonium Chloride
Iron Sulphide
Borax
Lead Acetate
Ammonium Oxalate
Sodium Phosphate
Blue and Red Litmus Books

Packed in Black Stained Wood Box, with Divisions for Bottles, &c., Hinges, Lock and Key, and Handles. Size $20 \times 14 \times 10\frac{1}{2}$ in.

SET OF APPARATUS AND CHEMICALS

For the Determination of Crystallizable Sugar by Polarization.

Recommended by Prof. J. B. Harrison, Government Analyst.

Schmidt and Haensch Half Shadow Polariscope
3 extra Metal Observation Tubes, 200 mm.
2 doz. extra Cover Plates for ditto
2 doz. India Rubber Washers for ditto
Adjustable Lamp with Shade, for use with Polariscope
1 each Quartz Test Plates, about 50°, 80°, 90° and 96°
Becker's Balance in Mahogany Glass Case, with Adjusting Screws and Level, to carry 100 grammes
1 set Becker's Weights, 50 grammes to 1 milligramme
2 German Silver Basins, with Counterpoises for weighing Sugars
4 Special Weights
18 Glass Funnels
3 doz. Packets Rhenish Filter Papers
1 doz. Hydrometer Immersion Tubes
6 Flasks, marked 100 c.c.
6 each Flasks, marked 50 and 55 and 100 and 110 c.c.
2 each Pipettes, marked 1, 2, 5 and 50 c.c.
2 Hydrometers, in single degrees, graduated at 85° F.
2 Immersion Tubes for ditto
2 Wedgwood Mortars and Pestles
2 Ebonite Spatulas
2 German Silver Spatulas
1 Thermometer, graduated on Stem
2 Washing Flasks
1 doz. Concave Covers
2 lb. Acetic Acid, pure
2 lb. Hydrochloric Acid, pure
2 lb. Moist Alumina Hydrate
1 lb. Animal Charcoal, pure
5 lb. Basic Acetate Lead
2 lb. Sodium Bisulphate
1 lb. ,, Carbonate
1 lb. Ether Methylated
1 pint Alcohol
1 lb. Sugar, chemically pure
1 doz. Books Neutral Litmus Paper

Packed in Tin Lined Cases for Export, £43.

SET OF APPARATUS

For the Estimation of Nitrogen in Manures, &c.

Kjeldahl's Method, as used by Messrs. Allen and Moore.

1 Piece of pure Tin Tubing
1 Copper Flask
2 Bohemian Flasks, 6 oz. capacity
3 Hard Glass round bottom Flasks, 8 oz. capacy.
1 Retort Stand and Clamp
1 Fletcher's Burner
1 Cylindrical Funnel, with Rubber Tube and Pinchcock
2 India Rubber Corks, 1 Hole
1 ,, ,, 2 ,,
1 Glass Connector
1 ,, Beaker

Chemicals and Solutions for use with above.

4 oz. Mercuric Oxide
1 lb. Potassium Sulphate
1 litre Potassium Sulphide Solution, 4 %
1 litre Decinormal Soda Solution
2 lbs. Sulphuric Acid

A "Blank" with the above Apparatus and Chemicals generally requires ·2 c.c. of decinormal acid equal to ·0003 grammes of Nitrogen.

Packed in Box, complete, £1 15s.

PARKES' CHEMICAL CABINET.

Designed by E. A. Parkes, M.D., F.R.S. (late Professor of Hygiene, Royal Victoria Hospital, Netley).

The Set is arranged for the complete examination of Water, Air, &c., in a stout Polished Teak Cabinet, with Metal Clamps, lined with Green Baize, and fitted with partitions for Bottles and Trays for the Apparatus. It is specially adapted for up-country travelling in India and the Cape.

I. Top Portion—Back.

16 ½ litre Bottles, holding the following Standardized Solutions—
Permanganate of Potassium
Chloride of Ammonium
Nitrate of Silver
Soap Solution
Nitrate of Barium
Oxalic Acid
Solution Sulphuric Acid for Carbonates
Alkaline Solution for Acidities
Ferric Solution

Sodium Hydrate Solution from Metal Sodium for NO_3
Wanklyn's Solution of Permanganate of Potassium and Solid Caustic Potash
Nessler's Solution
Lime Water
Distilled Water
Distilled ditto
Alcohol
2 Shaking Bottles for Soap Test
1 Funnel (2 others in drawer)
2 Long Tube Brushes for cleaning Burettes
1 doz. Test Tubes (on right hand side of chest)

II. Tray.

14 small Bottles, to contain weighed quantities of the undermentioned articles—
4 containing Permanganate of Potassium (·1975 gramme for ½ litre of water)
3 containing Nitrate of Barium (·13 gramme for ½ litre of water)
3 containing Oxalic Acid (3·15 grammes for ½ litre of water)
1 containing Brucine (1 gramme)
1 containing Chloride of Ammonium (·1575 gramme)
2 containing Pasteur's Powder (1·0 gramme)
1 doz. Books each of Litmus and Turmeric Paper in turned wood boxes
1 100 c.c. Measure graduated to c.c.
1 Burette to deliver 25 c.c. graduated to ½ c.c.
1 Burette to deliver 10 c.c. graduated to $\frac{1}{10}$ c.c.
1 Stoppered Burette, delivering 50 c.c. graduated to ½ c.c.
6 Jets with India Rubber Tubing for Burettes
6 Pinchcocks for ditto
1 Thermometer, graduated from 0 to 400° Fahr.
1 Wet and Dry Bulb Thermometer for Air Analysis
1 Gilt Urinometer from 1·000 to 1·040
1 Gilt Hydrometer from 1·000 to ·980
1 Vogel's Lactoscope
2 Round Porcelain Dishes for incineration
3 Porcelain Crucibles with Covers
3 Glass Stirring Rods
1 Engineer's 2 ft. Rule, with Brass Slide
4 India Rubber Caps, with 2 Necks
1 Tape Measure

III. Under Tray.

11 4 oz. Bottles, containing Solutions, viz.—
Iodide of Potassium
Oxalate of Ammonium
Fehling's Sugar Test
Iodine Solution
Cochineal Solution
Acetate of Lead
Dilute Hydrochloric Acid
Dilute Nitric Acid
Monochromate of Potassium
Brucine
Molybdate of Ammonium
2 3 oz. Bottles, with Glass Caps, containing—
Sulphide of Ammonium
H_2S in Glycerine
24 4 oz. wide-mouthed stoppered Bottles, containing dry substances, viz.—
Red Prussiate of Potassium
Yellow Prussiate of Potassium
Chloride of Ammonium
Chloride of Gold
Chloride of Barium
Nitrate of Barium
Oxalic Acid (crystallized)
Oxalate of Ammonium
Nitrate of Silver
Nitrite of Potassium
Permanganate of Potassium
Soft Soap
Hyposulphite of Sodium
Nitroprusside of Sodium
Sulphate of Copper
Copper Foil
Aluminium Foil
Zinc Foil
Starch
Sulphate of Iron
Isinglass
Phenol-Phthaleine
Meta-Phenylenediamine
Pasteur's Microzyme Test. To prepare this Test take 1 gramme of the powder, and 10 c.c. distilled water, boil and decant the clear solution
Solutions of some of these should be made and put in other bottles, so as to be ready when required
1 3 oz. Bottle with Glass Cap and engraved Label, containing strong and pure Sulphuric Acid in Tin Case
1 Brass Spirit Lamp
1 Tin Swedish Filter Papers
4 Brass Burette Holders
2 Brass Rings
1 Air Meter

IV. Drawer.

2 Stoppered Retorts
1 Copper Liebig's Condenser
1 Chemical Balance in Mahogany Box
1 Set Metrical Weights in Mahogany Box, with Forceps

1 each	and 2	
20, 10, 5, 2,	1	grammes
1	2 each	
5,	3, 2, 1,	decigrammes
1 each,	2 each	
5, 3,	2, 1,	centigrammes

2 Receivers
1 Collapsing Tripod
4 yards India Rubber Tubing
1 Iron Stand with Rod and Nut
1 Universal Clamp
2 Glass Flasks
1 Nest of Glass Beakers
2 Glass Funnels
3 Evaporating Dishes

Price, **£25.**

LIST OF APPARATUS

REQUIRED FOR THE

ELEMENTARY PHYSICS AND CHEMISTRY SYLLABUS

Contained in the new Continuation Code, as recommended by Mr. H. GORDON in his book, "Practical Science," Part I.

1 Spirit Lamp, 4 oz. Glass
1 Bunsen's Burner, $\frac{3}{8}$ in., and Rose
2 Clips, $\frac{1}{4}$ in.
6 ft. India Rubber Tube, $\frac{5}{16}$ in.
2 Pipeclay Triangles, large
4 Conical Flasks, 3 oz.
2 India Rubber Corks, $\frac{7}{8}$ in., 1 hole
2 India Rubber Corks, $\frac{7}{8}$ in., 2 holes
2 lb. Glass Tubing, $\frac{3}{16}$ to $\frac{3}{8}$ in.
2 ft. each India Rubber Tube, $\frac{1}{8}$ and $\frac{3}{16}$ in. diam.
2 Glass Funnels, $3\frac{1}{2}$ in., plain
1 Packet Rhenish Filter Papers, $18\frac{1}{2}$ cm., 595
4 Royal Berlin Porcelain Basins, 4 in. diam.
4 Bohemian Glass Flasks, 8 oz.
2 Nests Bohemian Glass Beakers, Nos. 1 to 4
1 Thermometer, 200° C., $\frac{1}{4}$ in. diam.
1 Thermometer, 220° F., $\frac{1}{4}$ in. diam.
4 doz. Corks, assorted
1 Brass T Piece, $\frac{3}{8}$ in.
1 pair Iron Tongs, with Bow, 6 in.
1 Condenser, 12 in.
1 Retort Stand, 15 in., and Clamp with right and left Screw
3 Becker's Balances, No. 66
3 Sets Weights (grammes) and Forceps
1 Set Weights (grains)
1 Fletcher's Argand Burner, $\frac{3}{4}$ in., Fig. 201
1 Graduated Measure, 100 c.c.
1 Barometer Tube
1 Set (6) Cork Borers
1 each File, round and triangular, 4 in.
1 Tripod, 6 × 4 in.
1 Iron Bath with Lid, special
2 pieces Wire Gauze, 6 × 6 in.
2 oz. Copper Wire, No. 18
3 lb. Mercury
2 Boxwood Levers, with Fulcrum
1 Set (8) Cubes of Wood, 2 cm.
1 Set (8) Cubes of Wood, 4 cm.
2 doz. Boxwood Rules, 12 in., divided in cms. and $\frac{1}{10}$ths, and in inches and $\frac{1}{10}$ths
1 doz. Stoppered Bottles, 4 oz.
1 Set (6) Wooden Block Supports
1 pair Hand Bellows, small
1 Board for mounting Barometer Tube, with Brass Scale, 4 in., divided in $\frac{1}{10}$ths, 28 to 32 in.
2 doz. ordinary Test Tubes
2 doz. Boiling Tubes
8 Cubes of Wood, 1 in., fitted in box
1 Wet and Dry Bulb Thermometer
Seaweed
2 pints Sea Water
3 Specific Gravity Tables
4 Clock Glasses, 4 in.
1 Reel Fine Iron Wire
3 N. M. Stoppered Bottles, 2 oz.
1 Batswing Burner

In Packing Case complete, £11 ;
or with only 2 Balances and Weights, £8 18s.

Extra Rulers can be obtained at 1s. 10d. per dozen.

Where it is considered desirable that extra quantities of Apparatus, &c., should be supplied, they will be charged at Catalogue prices.

DIPLOMA OF PUBLIC HEALTH SET,

AS SUPPLIED TO

COLLEGE OF STATE MEDICINE.

18 Test Tubes
1 Test Tube Brush
2 each B.P. Basins, 4 in. and 6 in.
1 Glass Stirring Rod
1 each Boiling Flasks, 16, 20, 40 oz.
1 Gas Generating Flask, 16 oz.
3 India Rubber Corks for Flasks, &c.
2 Watch Glasses, 2 in., flat bottom
3 Glass Funnels
4 ft. Glass Tube
1 Nest Beakers, 10—20 oz.
1 Piece Fine Wire Gauze, 12 in. square
3 Wire Triangles covered with Pipeclay
3 ft. Black India Rubber Tube
1 Triangular File and Handle
1 pair Gun-metal Crucible Tongs
2 Books each Test Papers—Blue, Red and Turmeric
1 each Glass Cloth and Duster
Piece Blue Glass, 3 × 1 in.
Platinum Wire fitted in Glass Rod
Test Tube Stand for 12 Tubes
1 Acid Funnel
1 each Wide Mouth Bottles, fitted with Corks, 10 and 20 oz.
1 Packet Swedish Filter Papers
1 Glass Condenser, fitted on Stand
2 Nessler Glasses
1 Marked Flask, 100 c.c.
1 Burette with Stopcock, 25 c.c. in $\frac{1}{10}$ths
1 Pipette, 10 c.c. in $\frac{1}{10}$ths
$\frac{1}{4}$ oz. Platinic Chloride, in Stoppered Bottle

Packed in Planed Deal Case, with Hook and Eye, and Hinges, £2 2s.

DR. ALLAN'S SET OF APPARATUS FOR QUALITATIVE ANALYSIS OF WATER AND AIR,

As recommended by him in his book, "Aids to Sanitary Science."

2 doz. Test Tubes
1 Test Tube Brush
1 ditto Holder
2 Glass Stirring Rods
3 B.P. Evaporating Basins
2 pieces Platinum Wire
1 piece Platinum Foil
1 Glass Pipette
1 Test Tube Stand, 24 holes
1 Spirit Lamp or Bunsen Burner
2 Nessler Glasses
1 Iron Tripod Stand
1 piece fine Wire Gauze
3 books Assorted Test Papers
1 Sulphuretted Hydrogen Apparatus
2 pieces Blue Glass

CHEMICALS IN STOPPERED BOTTLES.

2 oz. Hydrochloric Acid
2 oz. Sulphuric Acid
2 oz. Nitric Acid
4 oz. Ammonia Solution
2 oz. Ditto Chloride
½ oz. Ditto Molybdate
4 oz. Ditto Carbonate
4 oz. Ditto Sulphide
½ oz. Ditto Oxalate
4 oz. Sodium Phosphate
½ oz. Potass Chromate
1 oz. Ditto Ferrocyanide
1 oz. Ditto Ferricyanide
¼ oz. Potass Iodide
½ oz. Acid Tartaric
2 oz. Barium Chloride
¼ oz. Silver Nitrate Cryst.
1 oz. Brucine Solution
¼ oz. Iron Sulphate
1 oz. Soda-Nitroprusside Solution
1 oz. Nessler Test
8 oz. Iron Sulphide
1 oz. Lead Acetate
1 oz. Cobalt Nitrate Solution
4 oz. Potassium Hydrate

Packed in Stained Wood Case, with divisions for Bottles, Loose Tray, Handles, Lock and Key, complete, £2 2s.

THE PHARMACEUTICAL SET,

As arranged by Prof. Attfield for the Students at the Laboratory of the Pharmaceutical Society, Bloomsbury Square.

Packed in Smooth Deal Case, £1 5s.

THE ROYAL COLLEGE OF SCIENCE SET OF APPARATUS, £3.

In consequence of the reduction in the prices of the various articles comprised in this Set, Townson & Mercer are now prepared to supply the same at **£2 10s.**, delivered free at the Laboratory, provided that the order is sent *direct* to the firm, and accompanied by a remittance for the amount.

TOBACCO DUTY.

Apparatus required by Tobacco Manufacturers for ascertaining the amount of moisture in Tobacco, as recommended by the authorities of the INLAND REVENUE LABORATORY, Somerset House, London.

Chemical Balance, No. 29, in French Polished Mahogany Glass Case, with counterpoised Sliding Front, Brass Pans, and provided with Set Screws and Level for a charge up to 1,000 grains and sensible to $\frac{1}{50}$th grain, or 50 grammes and sensible to $\frac{1}{2}$ milligramme.

Set of Weights, in Polished Mahogany Box, 1,000 grains to $\frac{1}{1000}$th grain, or 50 grammes and intermediate weights to 1 milligramme.

Copper Water Drying Oven, with Sliding Shelf to take 6 Tin Pans, on Iron Stand.

Thermometer, graduated on Stem.

Six Tin Pans, with Covers numbered 1 to 6.

Bunsen's Burner, $\frac{9}{16}$ in., with Brass Rose Top.

5 ft. Red Vulcanized Rubber Tube.

Complete, including Packing Case, £6. Or with Patented Hot Water Oven, 11s. 6d. extra.

Or with Balance, without Set Screws or Level, £5 6s. 6d.

THE CHEAP SET OF AIR PUMP APPARATUS.

No. 1. £5.

This Set is intended to illustrate the properties of the atmosphere—its pressure, elasticity, resistance to falling bodies—and comprises an Air Pump, with Plate $5\frac{3}{4}$ in. diameter, a Clamp to fix the Pump on a Table, 3 Glass Receivers (one closed and two open), the Barometer or Torricellian Experiment, Magdeburg Hemispheres, Filtering Cup or Mercury Shower, Fountain in Vacuo, Bladder or Hand Glass, Capillary Tube, Balloon, Bladder and Lead Weight, Cartesian Figure in Tube, Water Hammer, Bell Experiment, Guinea and Feather Experiment.

Packing Case, 2s. 6d. extra.

No. 2.

The same Apparatus as above, with Tate's Air Pump in exchange, **£6 15s.**

CHEAP SETS OF ELECTRICAL APPARATUS.

First Set, £2 5s., with a Vulcanite Plate Machine.

Consists of an Electrical Machine, on French Polished Mahogany Stand, with Brass Conductor, also a pint Leyden Jar, Discharger, Head of Hair, Fulminating Plate, Set of 3 Conductors, Cone Cylinder and Ball, Electrophorus, Proof Plane, Pith Ball Stand, Whirl or Fly, and Chain.

Packing Case, 1s. 6d. extra.

Second Set, £5, with a Vulcanite Double Cylinder Machine.

Consists of a Machine with 2 Vulcanite Cylinders, largest $6\frac{1}{2}$ in. diameter, revolving one inside the other, pint Leyden Jar, Discharger, Pith Ball Electrometer, 2 Pith Figures and Insulated Plate, Head of Hair, Whirl, Hand Spiral, Set of 3 Bells, Brass Chain, Set of 3 Conductors, Leyden Jar with Moveable Coating, Gold Leaf Electroscope, Proof Plane, Rod each of Sealing Wax, Glass and Vulcanite.

Packing Case, 2s. 6d. extra.

Third Set, £7, with a Vulcanite Double Cylinder Machine.

Consists of a Machine with Cylinders 9 in. diameter, and a quart and pint Leyden Jar, Diamond Jar, Jar with Moveable Coating, Insulating Stool, Jointed Discharger, Quadrant Electrometer, 2 Pith Figures and Insulated Plate, Head of Hair, Whirl, Set of 3 Bells, Brass Chain, Rod each of Sealing Wax, Glass and Vulcanite, Proof Plane, Electrophorus, Set of 3 Conductors, Fur and Silk Rubbers, and Gold Leaf Electroscope.

Packing Case, 3s. extra.

THE CHEAP SET OF GALVANIC APPARATUS.

£5 5s.

Consists of a Battery of 4 Cells of Grove's, or 8 Cells of Bunsen's, giving sufficient power to decompose Water into its constituent Gases, heat Platinum Wire to redness, deflagrate Iron Wire, show the Electric Light, decompose Neutral Salts, ignite Alcohol, Gunpowder, Phosphorus, &c., and enable an Electro-magnet to sustain nearly 100 lbs. weight. The Set also includes the following Apparatus for the above Experiments, viz.—Decomposing Water Apparatus with 2 Tubes in Pneumatic Trough, Tube sufficiently strong to bear the explosion of the mixed Gases, Iron Wire, Platinum Wire, Electro-magnet, Carbon Holder on Stand, with Rackwork and Reflector for the Electric Light, Neutral Salts, Solution Tube with Electrodes, Ruhmkorff's Induction Coil with Commutator to give 1½ in. Spark, Galvanometer in Glass Shade, and set of 6 Vacuum Tubes.

Packing Case, 2s. extra.

One Grove's or Bunsen's Battery only is sufficient for the Induction Coil in showing the Vacuum Tubes, &c. The Induction Coil may be exchanged for a Coil Machine of the same price, with Handles for giving Shocks.

Estimates given for Sets of Apparatus as arranged for the purpose of Technical Instruction by Science Teachers in Schools, Colleges, Institutions, &c.

BOOKS ON CHEMISTRY, PHYSICS, MINING, AND METALLURGY, &c., &c.

	£	s.	d.
A Guide to Electric Lighting for Householders and Amateurs, by S. R. Bottone ...	0	1	0
A Treatise on Manures, by A. B. Griffiths	0	7	6
Analysis and Valuations of Fuels: Solid, Liquid and Gaseous, by H. J. Phillips ...	0	3	6
Assaying (a Text-book of), for the use of Mining Students, &c., by J. J. & C. Beringer	0	10	6
Bloxam's Chemistry, Inorganic and Organic	0	15	0
,, Laboratory Teaching	0	5	6
Chemistry (a short Manual of), by Dr. Dupré and Dr. H. Wilson Hake	0	7	6
Chemistry, by J. Attfield	0	15	0
Church's Laboratory Guide	0	6	6
Coal, Tar and Ammonia, by Lunge	1	11	6
Dairy Farming, by Prof. J. P. Sheldon	0	2	6
Electricity and Magnetism, by Dunman...	0	1	0
Electric Light—Its Production and Use. Embodying plain directions for the treatment of Dynamo Machines, Batteries, Accumulators, &c.	0	7	6
Electric Light Installations, by Sir D. Salomons, Vol. I. 5/-, Vol. II.	0	7	6
Electric Lighting and Power Distribution, by W. Perrin Maycock	0	2	6
Electro Deposition, by Alexander Watt...	0	9	0
Electro-Metallurgy, for the use of Students and Practical Men, by W. G. MacMillan	0	10	6
Electro-Plating, by J. W. Urquhart	0	5	0
Elementary Chemistry, by Roscoe	0	4	0
Engineering Chemistry, by Phillips	0	10	6
Five Hundred Chemical Experiments	0	1	0
Fixed Oils, Fats, Butters, and Waxes, and the Manufacture of Soaps, Candles and other products, by C. R. Alder Wright, D.Sc., F.R.S.	0	7	6
Foods, their Composition and Analysis, by A. Winter Blyth, M.R.C.S., F.C.S. ...	0	16	0
Fresenius' Qualitative Analysis	0	11	6
,, Quantitative Analysis	0	14	0
Fuels: Solid, Liquid, and Gaseous, by H. J. Phillips	0	5	0
Ganot's Physics	0	13	6
Gas Analysis, by Dr. W. Hempel	0	7	6
Gas Engineers' Manual, by Wanklyn	0	5	0
Handbook on Modern Explosives	0	10	6
Handy Book for Brewers, by H. E. Wright	0	12	6
How to Make a Dynamo, by S. R. Bottone	0	2	0
Jago's Chemistry	0	2	6
Manual of Bacteriology, by Crookshank...	1	1	0
Metallurgy, for the use of Students and Practical Men, by W. C. Roberts-Austen ...	0	7	6
Mining and Metallurgy, Prospectors' Handbook, by J. W. Anderson	0	3	6
Mitchell's Manual of Practical Assaying	1	8	6
Popular Natural Philosophy, by Ganot	0	7	6
Science Primers, Chemistry or Physics, by Prof. Roscoe	0	0	9
,, ,, Natural Philosophy, Elementary Geology, Magnetism	0	0	9
Scientific Mysteries	0	1	0
Sewage Disposal Works: a Guide to the Construction of Works for the Prevention of the Pollution by Sewage of Rivers and Estuaries, by W. Santo Crimp, M.I.C.E., &c.	1	5	0
Shenstone on Glass Blowing	0	1	6
Sound, Light, and Heat, by Dunman	0	1	0
Sound, Light, and Heat, by Wright	0	2	6
Stöckhardt's Experimental Chemistry	0	5	0
Students' Test Book of Electricity, by H. M. Noad	0	12	6
Sutton's Volumetric Analysis	0	17	6
Table for Estimating the Original Gravities of Beer	0	1	6
Tate's School Series—Chemistry, Magnetism, Electricity, and Pneumatics each	0	0	9
Technical Gas Analysis, by Winkler and Lunge	0	7	0
The Blowpipe in Chemistry, Mineralogy and Geology, by Lieut.-Colonel W. A. Ross	0	5	0
The Metallurgy of Gold, by M. Eissler	0	12	6
The Metallurgy of Silver, by M. Eissler	0	10	6
Thorp and Muir's Qualitative Analysis	0	3	3
Thorpe's Manual of Quantitative Analysis	0	4	0
Thorpe's Quantitative Analysis	0	4	6
Wanklyn's Air Analysis	0	5	0
,, Milk Analysis, including Cream, Butter, and Cheese	0	5	0
,, Tea, Coffee, and Cocoa Analysis	0	5	0
,, Water Analysis	0	5	0

TOWNSON & MERCER'S

SELECTION OF

APPARATUS AND CHEMICALS

IN GENERAL USE FOR

ASSAY OF GOLD AND SILVER.

The Numbers correspond with Townson & Mercer's Catalogue.

44	**Balance,** for rough weighing, to carry 1,000 grammes ...	£2	5	0
49	**Chemical Balance,** No. 10, for a charge up to 100 grammes, and sensible to $\frac{1}{5}$th part of a milligramme, Pans and Bows nickel plated, provided with 2 Rider Apparatus and Agate Knife Edges	9	6	8
97	**Oertling's Assay Balance,** No. 11, 8 in. Beam, to carry 30 grains and turn to $\frac{1}{1000}$th grain, Beam divided, and Apparatus fixed for moving Sliding Weights	15	0	0
138	**Weights,** Set of 1 gramme and its sub-divisions in 1,000 parts, in Platinum, for assaying Silver	1	10	0
139	**Weights,** Set of $\frac{1}{2}$ gramme and its sub-divisions in 1,000 parts, in Platinum, for assaying Gold	1	10	0
141	**Chemical Weights,** No. 4A, 50 grammes down to 1 milligramme, with nickel plated Forceps and 2 Riders ...	1	10	0
144	**Chemical Weights,** No. 32, 1,000 grammes down to 1 milligramme, with Brass Forceps	1	4	2
194	**Basins,** 3 each, German Porcelain, Berlin form, Nos. 2, 6, 7, 8	0	18	9
198	**Basins,** 6 Enamelled Iron, Evaporating, with Lip, 8 in. ...	0	7	0
207	**Beakers,** 3 Nests Best Bohemian Glass, 1—8	0	12	9
232	**Blowpipe,** Black's Brass, with Ivory Mouthpiece... 1 6 and	0	1	9
264	**Charcoal Blocks,** 12 Compressed, 6 × 1¼ in.	0	6	0
308A	**Bottles,** 1 doz. Stout German Glass, free from Lead, accurately stoppered, Narrow Mouth, for Test Solutions, 12 oz. ...	0	4	6
308A	**Bottles,** 1 doz. Stout German Glass, Wide Mouth, for dry Chemicals, 12 oz.	0	5	0
309	**Bottles,** 4 Best Stout German Glass, Cut Octagon Stoppers, with Etched Labels, for Acids, 12 oz.	0	11	0
	Corks, finest quality, picked for Chemical purposes, 1 gross assorted	0	6	0
401	**Cork Borers,** Set of 6 Brass Tube, best	0	2	6

412	**Covers,** 1 doz. Concave, for Beakers, assorted	£0	3	0
413	**Crucibles,** with Cover, 2 doz. Berlin Porcelain, No. 1, capacity $\frac{3}{4}$ oz.	0	15	0
420	,, 3 doz. Gold Assay, $1\frac{1}{4} \times 1\frac{1}{4}$ in.	0	7	6
422	,, 6 doz. London Round Fire Clay, No. 5 ...	0	18	0
424	**Covers** for ditto, 1 doz.	0	1	9
427	**Crucibles,** 1 doz. Salamander, No. 8... ...	1	8	0
	Covers for ditto, 3 only	0	4	0
435	**Scorifiers,** 12 doz. Clay, $2\frac{1}{2}$ in.	0	7	6
436	**Roasting Dishes,** 1 doz. Clay, 3 in.	0	1	9
442	**Platinum Crucible,** with Cover ... ... about	2	10	0
452	**Cupels,** 12 doz. best French Bone Ash, No. 7, $1\frac{1}{2}$ in. ...	1	7	0
453	**Cupel Mould,** Polished Steel, $1\frac{1}{2}$ in....	0	14	0
453A	,, ,, Iron, instead of Steel	0	9	0
454	**Cupel Tray,** Sheet Iron, with 16 Divisions	0	4	0
553	**Files,** 2 each Triangular and Round, with Handles ...	0	2	0
568	**Filter Paper,** 2 Packets each Rhenish (No. 595), 5 and $7\frac{1}{4}$ in.	0	3	2
587	**Flasks,** 1 doz. each best Bohemian, 8, 12, 20 oz. ...	1	0	6
589	,, 1 ,, ,, ,, German, Conical Form, 8 oz. ...	0	3	0
599	,, 1 ,, ,, ,, Conical Assay, 8 oz.	0	4	6
611	**Flatting Mill,** best make, Steel Rollers, 2 in. diam. ...	4	10	0
632	**Forceps,** Polished Steel ... ... 4 in. 1/, $5\frac{1}{4}$ in.	0	1	6
639	**Funnels,** 6 each, best Bohemian Glass, $3\frac{1}{4}$ and $3\frac{3}{4}$ in. diam., with Ground Edges, the Sides inclined at an angle of 60°	0	6	6
640	**Funnels,** 1 doz. best German Glass, 1 in. diam.... ...	0	1	4
666	**Funnel Holder,** Teak, for 2, Square Bottom	0	3	0
678	**Furnace,** Sheet Iron, lined with Fire Bricks, with Cast Iron Rings and Sand Bath, for Assaying and Cupelling, depth of body 19 in., internal diam. 12 in., with Sheet Iron Elbow and 6 ft. of Chimney	5	5	0
1103	**Muffles** for above, 1 doz., $12 \times 6 \times 4$ in.	2	8	0
810	**Glass Tubing,** 3 lbs.	0	3	0
819	**Glass Rod,** 1 lb.	0	1	0
967	**Spirit Lamps,** 2 Glass, with Ground Cap and Earthenware Wick Holder, capacity 4 oz.	0	1	8
977	**Berzelius' Argand Spirit Lamp,** Brass, on Rod with Wooden Foot, Brass Rings and Chimney, with 1 doz. extra Wicks	0	16	6
983D	**Petroleum Oil Stove,** with central draught; can be worked with or without blast arrangement; very powerful ...	1	1	0
1023	**Microscope,** Monocular, Universal Spring Stage, $\frac{1}{4}$ in. Achromatic Lens, dividing to $\frac{1}{2}$ in. and $\frac{3}{4}$ in., in Polished Mahogany Case	5	0	0
1042A	**Magnifying Lens,** Triple, for examining Crystals, &c., or in Blowpipe operations, mounted in Horn	0	3	6

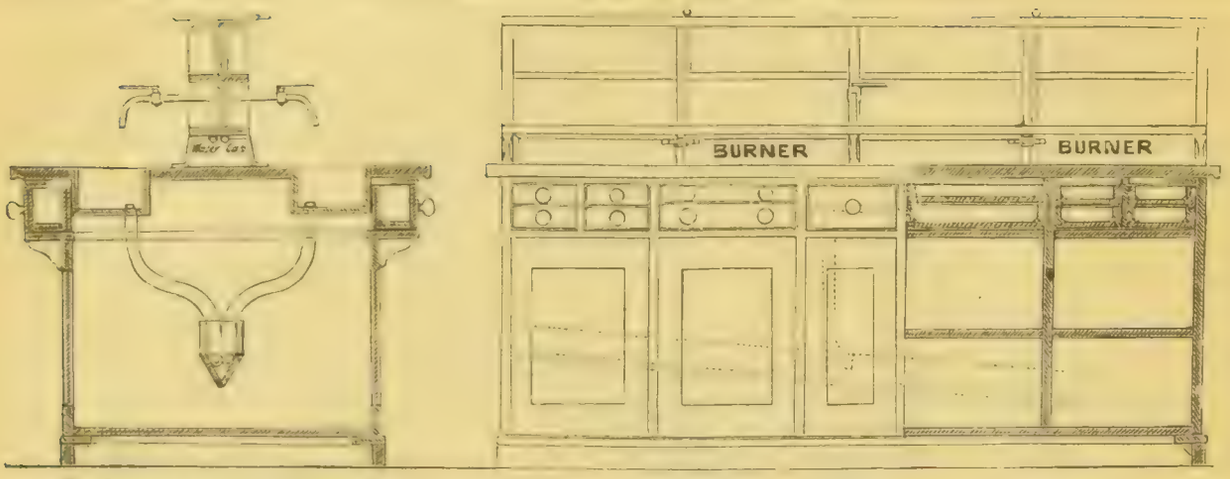
1048A	**Steel Anvil,** 4 × 4 × 1 in., for flattening Beads of Gold or Silver	£0	5	6
1049	**Anvil or Stake,** for flattening large Beads of Gold or Silver, 3½ × 3½ in., with Fang	0	18	6
1054	**Steel Vice,** to screw to Table, extra strong ... 10/6 and	0	15	6
1055	**Chisel,** for cutting Metals	0	1	6
1057	**Hammer,** Steel Ends, pointed	0	2	6
1058	,, ,, ,, rounded	0	3	0
1062A	,, ,, ,, square faced, Geological	0	4	0
1064	**Mallet,** Boxwood	0	2	0
1066	**Plyers,** Black Steel ... ... 1/ and	0	1	6
1067	,, Cutlers' Steel, for cutting Metals and Wire ... 2/6 and	0	3	0
1067A	**Tweezers,** for holding Prills	0	2	0
1068	**Assay Shears,** for cutting Metals, 10 in.	0	3	6
1069	**Assay Scoops,** 1 each Copper, with Wood Handle, 6 and 8 in.	0	8	6
1070	**Horn Scoops,** 3	0	1	6
1071A	**Brushes,** 2 Hard, for cleaning Prills...	0	1	8
1071B	**Chamois Leathers,** 3, best quality, large size ... 6/ and	0	7	6
1071C	**Scissors,** 1 Pair	0	1	6
1073	**Ingot Mould,** Conical Form, with Foot, Turned inside ...	0	3	0
1076	,, ,, Turned and Polished Steel, 2 Holes, with Handle	0	5	0
1079	,, ,, 2 Cast Iron, for Bars, 6 × 1⅞ × 2 in.	0	3	6
1087	**Mortar and Pestle,** Iron, Bowl shaped, Turned inside, 7¾ in.	0	8	6
1088	,, ,, ,, Bell ,, ,, ,, 10 in.	0	11	0
1088A	,, ,, Cast Steel, Turned inside, 6¼ in. 15/, 8½ in.	1	1	0
1089	,, ,, Wedgwood ... ... 6½ in.	0	2	6
1096	,, ,, Agate, highly polished, for pulverization of hard substances ... 3 in.	0	12	0
1098	,, ,, Cast Steel, weight 30 lbs. ... 6 in.	0	18	6
1098A	**Panklast Ore Pulverizer,** which will crush the hardest substances to any degree of fineness. All working parts made of Steel	5	10	0
1098B	,, No. 2, for steam power	32	0	0
1104	**Buckets,** Iron, enamelled inside for Mercury, Japanned outside. Diameter at top ... 6 8 10 in. 4/ 5/ 7/ each			
1105	**Gold-Washing Pans,** 4, Sheet Iron, 16 in. diam., 2¾ in. deep	0	10	0
1186	**Retort,** Cast Iron, for Mercury, &c., with long Leading Tube, to screw, Loose Head secured by Bolts, capacity 5 pints ...	1	0	0
1187	Ditto, ditto, with Condenser, capacity 5 pints	1	15	0
1205	**Sand Bath Dishes,** 1 each, 6 and 8 in.	0	0	9
1224	**Sieves,** Brass Wire, 6 in. diam., Japanned Tin Frames with Cover and Bottom, set of 3, Meshes Nos. 30, 60, 90 ...	0	7	6
1226	**Spatulas,** 3 Steel, 5 in.	0	2	3
1235	,, 1 Platinum ... ... about	1	0	0

1361	**Tripod Stands,** 2 Iron, Triangular, 8 × 7½ in.	£0	2	0
1369	**Still,** Tin Plate, with Pure Tin Condensing Worm, in Zinc Reservoir, capacity 2 gallons	1	7	6
1426	**Test Tubes,** 3 doz. best Bohemian Glass, 5 × ⅝ in. ...	0	1	6
1434	**Test Tube Cleaners,** 3, with Sponge or Bristle Ends ...	0	0	6
1441	**Test Tube Holder,** Flat Form, strong Spring Clip, in Wood Handle	0	0	10
1447	**Test Tube Stand,** Teak, with Draining Pegs, 8 Holes and Pegs	0	1	3
1504	**Crucible Tongs,** Polished Iron, 8 in.	0	1	3
1505	,, ,, Gun Metal, 8 in.	0	1	6
1515	**Bow Tongs,** Iron, length 18 in.	0	2	3
1516	,, ,, ,, with Bend, length 20 in.	0	3	3
1517	**Basket** ,, ,, length 28 in.	0	7	6
1519	**Furnace Tongs,** with Bend, length 18 in.	0	1	9
1520	**Charcoal** ,, ,, ,, ,, 18 in.	0	2	0
1521	**Cupel** ,, elastic Iron, length 30 in.	0	3	0
1523	**Scorifier** ,, length 24 in.	0	3	0
1524	**Iron Poker,** for arranging fuel in Furnace, length 3 ft. ...	0	1	6
1525	**Bar Scraper,** length 3 ft. 6 in.	0	2	0
1528	**Triangles,** 1 doz., covered with Pipeclay	0	1	9
1669	**Washing Flask,** Gmelin's, capacity 16 oz., fitted with bent Tube and India Rubber Cork	0	1	3
1687	**Watch Glasses,** 2 doz., 2 in. diam.	0	2	0

CHEMICALS.

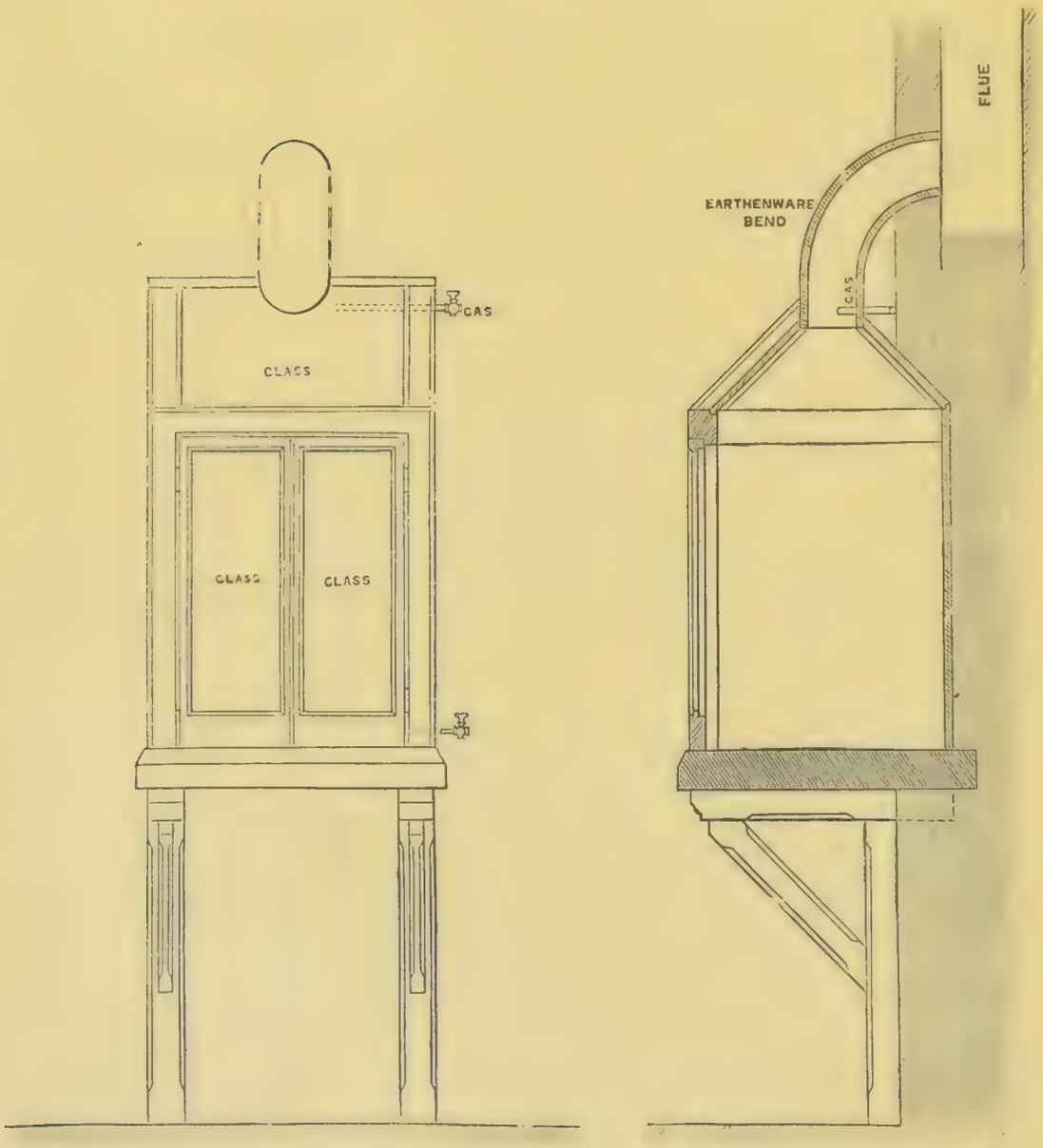
12 W. Qts.	Hydrochloric Acid, Pure, 78	lb. at 3½d.	22/9,	12 Bots., stopd.	9/	£1	11 9
8 ,,	Nitric ,, ,, 60	,, 6½d.	32/6,	8 ,, ,,	6/	1	18 6
4 ,,	Sulphuric ,, ,, 40	,, 3½d.	11/8,	4 ,, ,,	3/	0	14 8
12 ,,	Ammonia Solution, 880, 54	,, 5d.	22/6,	12 ,, ,,	9/	1	11 6
56 lb.	Bone Ash, best, for Cupels at 40/	20/	Tins ...		3/	1	3 0
56 lb.	Borax, refined... ...	40/ = 20/	,, ...		3/	1	3 0
or 28 lb.	,, calcined ...	1/2 32/8	,, ...		2/	1	14 8
7 lb.	Charcoal Powder, Wood	4d. 2/4	,, ...		1/6	0	3 10
1 lb.	Black Flux ...	4/	Stopd. Bot.		10d.	0	4 10
7 lb.	Lead Foil, Assay ...	7d.	...	...		0	4 1
7 lb.	Lead Grain ...	10d. 5/10	...Tin		4d.	0	6 2
1 cwt.	Litharge, best... ...	35/	...Keg		2/	1	17 0
	Mercury, Metal (varies)...	...	...Per Bottle			7	10 0
	Methylated Spirit ...	...	...Per Gall.			0	3 6
56 lb.	Potassium Cyanide ...	2/ 112/	...Jar		8/	6	0 0
28 lb.	,, Nitrate ...	5d. 11/8	...Jar		4/	0	15 8
56 lb.	Sodium Carbonate, dried	6d. 28/	...Tin		5/	1	13 0

The above List is intended as a guide only of the usual requirements for an outfit for Gold and Silver Assay, and the quantities, &c., would necessarily have to be varied according to circumstances.



Laboratory Bench, best Yellow Deal, Varnished, $1\frac{1}{4}$ in. Top, fitted with Taps, Basins and Connections for Water and Gas. Each Basin is supplied with a Cover when not in use. Shelves for Bottles; Drawers and Cupboards for Apparatus. Size of Bench for each Student, length 3 ft. 6 in., width 2 ft. 3 in., height 3 ft. 3 in.

Price as above for	4	8	16 Benches
	£15	£24	£35



Fume Cupboard, best Yellow Deal, fitted with Glass Doors and Top. Size of Cupboard inside 2 ft. 6 in. × 2 ft. 2 in. £4 5 0

Estimates given for fixing the above, the price depending on the position, &c.

TOWNSON & MERCER'S

REVISED AND REDUCED NETT

Price List of Pure Chemicals

For ANALYSIS, &c.,

89, BISHOPSGATE STREET WITHIN, LONDON, E.C.

As a general rule, where the Price is quoted at per ounce, larger quantities will be charged at as many shillings per pound as the ounce is pence, and *vice versa.*

		s.	d.
Acetone, pure	lb.	2	6
Acid, Acetic, pure	,,	0	5
,, ,, ,, W. Qt. (about 5½ lb.)	,,	0	1½
,, ,, glacial, at 50° F. ...	,,	1	0
,, ,, ,, W. Qt. (about 5½ lb.)	,,	0	11
,, Arsenic, Dry, pure ...	,,	2	0
,, Arsenious	,,	0	8
,, Benzoic, from Toluol ...	oz.	0	6
,, ,, from Gum	,,	0	8
,, Boracic, pure	lb.	0	8
,, ,, fused	,,	4	6
,, Butyric, coml. concentrated	,,	6	0
,, ,, pure	,,	20	0
,, Carbolic, crystal, in 1 lb. Bottles	,,	2	0
,, Chromic, crystal, pure ...	,,	3	0
,, ,, for Batteries ...	,,	1	2
,, Citric, purified	,,	2	3
,, Fluoric	,,	1	0
,, ,, re-distilled ...	,,	2	0
,, Formic, concentrated, sp. gr. 1·20	,,	7	6
,, Gallic	,,	4	0
,, Hippuric, crystal	oz.	3	6
,, Hydrochloric, coml. ...	lb.	0	2
,, ,, coml. W.Qt. (about 6½ lb.)	,,	0	1½
,, ,, Carboy (about 120 lb.)	,,	0	1
,, ,, pure	,,	0	5
,, ,, ,, W.Qt. (abt. 6½ lb.)	,,	0	4
,, ,, ,, 12 W. Qts.	,,	0	3½
,, ,, ,, *for Analysis*	,,	0	8
,, ,, ,, W. Qt. ...	,,	0	7
,, Hydrofluosilicic	,,	1	6
,, Hydrosulphuric Soln. in Glycerine	,,	3	0
,, Hydriodic	oz.	2	0
,, Iodic, solid	,,	2	3
,, Lactic, concentrated, sp. gr. 1·21	lb.	8	0
,, Malic, crystal	oz.	3	0
,, Meconic	,,	8	0
,, Molybdic	lb.	6	6
,, Nitric, coml.	,,	0	5
,, ,, ,, W.Qt. (about 7½ lb.)	,,	0	4½
,, ,, Carboy (about 140 lb.)	,,	0	4
,, ,, pure	,,	0	7
,, ,, ,, W. Qt. (about 7½ lb.)	,,	0	6½
,, ,, ,, *for Analysis* ...	,,	0	10
,, ,, ,, sp. gr. 1·5, fuming	,,	1	0
,, ,, ,, W. Qt. (about 7½ lb.)	,,	0	11
,, Nitrous	,,	0	7

		s.	d.
Acid, Oleic	lb.	1	0
,, Osmic ... ...1 gramme in tube		5	0
,, ,, Solution 1 ...	oz.	2	6
,, Oxalic	lb.	0	8
,, ,, pure	,,	1	6
,, Phosphoric, Anhydrous, 1 oz. bot.	oz.	1	3
,, ,, Syrupy ...	lb.	2	0
,, ,, glacial, pure ...	oz.	0	3
,, Phosphorous	,,	0	6
,, Phospho-Molybdic solution	,,	0	9
,, Picric (*Carbazotic*) crystal ...	lb.	3	0
,, Pyrogallic, 1 oz. bottles ...	oz.	1	0
,, ,, Schering's ...	,,	1	0
,, Rosolic	,,	1	0
,, Salicylic	lb.	7	6
,, Silicic, coml.	,,	0	6
,, ,, pure	,,	1	0
,, Stearic	,,	1	6
,, Succinic, pure	,,	6	0
,, Sulphuric, coml.	,,	0	2
,, ,, ,, W.Qt. about 16 lb.	,,	0	1¾
,, ,, Carboy (about 180 lb.)	,,	0	1
,, ,, pure	,,	0	5
,, ,, ,, W.Qt. (about 10 lb.)	,,	0	4
,, ,, ,, 12 W. Qts. ...	,,	0	3½
,, ,, ,, *for Analysis*	,,	0	6
,, ,, ,, Nordhausen, sp. gr. 1·880	,,	0	11
,, Sulphurous	,,	0	3
,, ,, W. Qt. (about 6½ lb.)	,,	0	2½
,, Tannic	,,	3	0
,, Tartaric, powder or cryst. ...	,,	2	0
,, ,, pure	,,	3	3
,, Titanic	oz.	5	0
,, Tungstic, pure	,,	1	0
,, Uranic	,,	3	6
,, Uric, pure	,,	2	0
,, Valerianic, pure	,,	1	0
Albumen, Blood	lb.	3	0
,, Egg	,,	1	0
Agar-Agar	,,	1	6
Alcohol, absolute	,,	1	0
,, Amylic, coml. (*Fusel Oil*) gall. 3/6	,,	0	9
,, ,, pure	,,	1	6
,, ,, methylic ...	,,	3	6
Aldehyde, medicinal	,,	7	0
Alizarine, pure artificial ...	oz.	1	6

			s.	d.
Alizarine, commercial	oz.		0	2
Alloxan, crystal	,,		5	6
Alum, lump	lb.		0	3
,, powdered	,,		0	4
,, Ammonia	,,		0	6
,, Chrome	,,		0	6
,, Iron	,,		0	10
,, Potash...	,,		0	3
,, ,, pure	,,		0	7
,, Roche	,,		0	6
Aluminium Oxide, precipitated, pure	oz.		0	9
,, ,, Hydrate, pure	lb.		3	0
,, ,, ,, coml.	,,		0	10
,, ,, moist ...	,,		1	3
,, Phosphate	,,		6	0
,, Sulphate	,,		0	5
,, ,, cryst. purified	,,		1	0
,, ,, pure ...	,,		3	6
,, Tannate	,,		5	0
,, Ingot	oz.		1	0
,, ,, ...	lb.		10	0
,, Sheet or Wire ...	oz.		1	0
,, Leaves	book		1	6
,, Chloride, pure dried...	lb.		3	0
,, Anhydrous, in 1 oz. stoppered bottles, 1/6	,,		12	0
,, Nitrate	,,		5	0
Amalgam, Electrical	oz.		0	6
,, Sodium	1 lb. tin		9	0
Amber	oz.		0	1
Amidol	,,		2	0
Ammonia, solution, conc., sp. gr. ·880,	lb.		0	6
,, ,, ,,W.Qt.(abt.$1\frac{1}{2}$lb.)	,,		0	5
,, ,, pure ...	,,		0	9
,, ,, ,, W. Qt.	,,		0	8
,, ,, ,, (*Analysis*)	,,		1	3
Ammonium, Acetate, soln. ...	,,		0	10
,, ,, cryst. ...	,,		1	0
,, Arseniate... ...	,,		5	0
,, Benzoate	,,		1	0
,, Bichromate ...	,,		3	0
,, Borate	,,		1	0
,, Bromide	,,		2	6
,, Carbonate, coml. ...	,,		0	7
,, ,, ,, 7 lb. jars	,,		0	6
,, ,, pure, *for Analysis*	,,		1	6
,, Chloride (*Sal Ammoniac*), lump, cwt. 56/	,,		0	7
,, ,, crushed for batteries	,,		0	7
,, ,, pure, powdered	,,		0	9
,, Citrate	oz.		0	6
,, Iodide	,,		1	6
,, Molybdate ...	lb.		4	6
,, Nitrate, pure, cryst.	,,		1	4
,, Nitrite, solution ...	,,		4	6
,, Oxalate, pure ...	,,		2	0
,, ,, ,, *for Analysis*	,,		3	0
,, Phosphate ...	,,		2	0
,, ,, pure ...	,,		2	6
,, Salicylate, artificial	oz.		1	0
,, Succinate	lb.		10	0
,, Sulphate	,,		0	4
,, ,, pure ...	,,		0	10
,, Sulphide Solution ...	,,		0	8
,, ,, W.Qt.(about 6 lb.)	,,		0	7
,, ,, extra strong	,,		0	10
,, Sulphite, crystal ...	,,		4	6
,, Sulphocyanide, pure	,,		2	6
,, Urate, pure ...	oz.		3	0
,, ,, ,, Boa's excrement	,,		1	6
Ammonium, Valerianate ...	oz.		1	0
,, Vanadiate ...	,,		5	0
Amyl Nitrate	,,		0	6
,, Nitrite	,,		0	8
Aniline, Oil	lb.		2	6
,, Sulphate	,,		4	0

ANILINE COLOURS.

Special prices for quantities of 1 *lb. and upwards.*

			s.	d.
Aurine (special orange) ...	oz.		2	0
Black	,,		1	0
Blue, Gentian	,,		1	0
,, Methyl	,,		2	6
,, Nicholson's	,,		1	6
,, Soluble	,,		1	6
Brown, Bismarck	,,		0	6
Chrysoidine	,,		0	6
Eosine	,,		1	0
Fluorescine	,,		2	0
Fuchsine	,,		0	9
Green	,,		1	6
Mauve	,,		1	0
Nigrosine (soluble in spirit)	,,		1	9
Orange	,,		2	0
,, Methyl. Indicator ...	,,		3	6
Phosphine	,,		3	0
Roseine	,,		0	9
Tropœoline	,,		1	0
Violet	,,		1	0
Yellow	,,		1	0
Anthracene	lb.		1	0
Anthrakinone	oz.		1	6
Antimony, Metal	lb.		1	0
,, Chloride, crystal ...	,,		5	0
,, Solution (*Butter of Antimony*)	,,		0	8
,, Oxide, pure ...	,,		2	0
,, Pot-Tartrate ...	,,		2	0
,, Sulphide	,,		0	6
,, ,, Red ...	,,		2	0
Argol, powdered	,,		0	9
Arsenic, Metal	,,		2	0
,, Sulphuret (*Realgar*) ...	,,		0	8
,, Sesquisulphuret (*Orpiment*)	,,		0	8
Asbestos	,,		1	3
,, long fibre (selected) ...	,,		6	0
Asphaltum	,,		1	0
Barium, Metal	grain		1	4
,, Acetate, pure... ...	lb.		3	0
,, Carbonate, Native ...	,,		0	3
,, ,, powdered ...	,,		0	4
,, ,, precipitated	,,		1	0
,, ,, ,, pure	,,		3	0
,, Chlorate	,,		2	6
,, Chloride, coml. ..	,,		0	4
,, ,, cryst. pure ..	,,		0	7
,, Chromate	,,		3	0
,, Nitrate, cryst. ...	,,		0	6
,, ,, pure	,,		0	10
,, Oxide (Hydrate Crystal) pure	,,		2	0
,, ,, Anhydrous ...	,,		4	0
,, Peroxide	,,		4	0
,, ,, crude ...	,,		2	0
,, Sulphate	,,		0	3
,, ,, pure (precip.) ...	,,		1	0
,, Sulphide	,,		2	6
Benzole, rectified, 90%... ...	pint		1	6
,, Nitro	lb.		1	9
Bismuth, Metal	,,		10	6
,, Carbonate, pure ...	oz.		1	0

			s.	d.
Bismuth, Nitrate, crystal	...	oz.	0	9
,, Oxide		,,	1	6
,, Sulphide		,,	1	9
Bone Ash, for Assaying	cwt. 10	lb.	0	5
,, Levigated, for surface of Cupels		,,	0	9
Borax, refined		,,	0	5
,, ,, ...		cwt.	10	0
,, ,, dried, for Assaying		lb.	1	2
,, ,, ,, ,,		cwt.	100	0
,, Glass		lb.	3	6
Boron, crystal		tube	5	0
Bromine, pure		oz.	0	6
,, (per bottle about 5 lb.)...		lb.	2	6
Brucine		oz.	5	6
,, Sulphate		,,	5	6
Cadmium, Metal		,,	0	8
,, Bromide, pure ...		,,	0	9
,, Carbonate ,, ...		,,	0	10
,, Chloride ,, ...		,,	0	8
,, Iodide ,, ...		,,	2	0
,, Nitrate ,, ...		,,	0	6
,, Oxide ,, ...		,,	0	10
,, Sulphate ,, ...		,,	0	8
,, Sulphide ,, ...		,,	0	8
Cæsium Chloride		gr.	1	0
Caffeine, pure crystal		oz.	1	0
Calcium, Metal		gr.	2	0
,, Acetate, pure... ...		lb.	3	0
,, Borate		,,	3	6
,, Bromide		,,	8	0
,, Carbonate, precipitated		,,	0	5
,, ,, ,, by Ammonia		,,	1	0
,, ,, (Iceland, or Calc Spar)		oz.	0	4
,, ,, (Marble, Carrara)		lb.	0	2
,, Chloride, dried Granular		,,	0	6
,, ,, ,, (14 lb.)		,,	0	5
,, ,, crystal ...		,,	0	6
,, ,, pure, fused ...		,,	1	9
,, Hypochlorite (*Chloride of Lime*)		,,	0	3
,, ,, ...		cwt.	15	0
,, Iodide		oz.	2	0
,, Nitrate, fused ...		lb.	2	6
,, Oxide, pure, from marble		,,	1	0
,, Phosphate, coml. (*Bone Ash*)		,,	0	5
,, ,, pure ...		,,	2	0
,, Phosphide		,,	5	0
,, Sulphate, pure precip.		,,	1	9
,, ,, (*Plaster Paris*)		,,	0	2
,, Sulphide		,,	1	9
,, ,, Phosphorescent		oz.	1	6
,, Sulphite		lb.	1	6
,, ,, Bi-Solution cwt. 20/		,,	0	6
Camphor ... ...(varies) in blocks		,,	2	6
Canada Balsam		,,	3	0
,, ,, dried ...		oz.	0	8
Caoutchouc, sheet		lb.	9	0
Carbon, Bisulphide, redrawn ...		,,	0	6
,, ,, W. Qt. (about 7 lb.)		,,	0	5
,, Tetrachloride ...		,,	7	6
,, Crushed, for Battery, cwt. 10/		,,	0	2
Cerite		,,	2	6
Cerium, Metal ...		gr.	2	0
,, Chloride ...		oz.	2	0
,, Nitrate ...		,,	2	0
,, Oxalate ...		,,	0	6
,, Oxide ...		,,	1	3
,, Sulphate ...		,,	1	0
Charcoal, Animal, grain		lb.	0	4
,, ,, powder ...		,,	0	4
Charcoal, Animal, powder, pure		lb.	3	0
,, Wood, lump ...		,,	0	3
,, ,, powder ...		,,	0	4
,, Swedish Blowpipe, in blocks		,,	1	6
Chloral Hydrate		,,	5	6
Chlorine Solution		,,	0	6
Chloroform, pure, from alcohol ...		,,	6	0
,, Methylated ...		,,	2	9
Chrome Iron Ore		,,	1	6
Chromium, metal		tube	2	6
,, Oxide (*Hydrate*) ...		lb.	2	9
,, ,, green ...		,,	3	0
,, Chloride cryst. sublimed		oz.	4	0
,, ,, solid green...		lb.	3	0
,, Sulphate, cryst. ...		oz.	0	6
Cinchonidine, cryst.... ...		,,	1	6
Cinchonine, pure cryst. ...		,,	1	3
Cinnabar...		,,	0	6
Clay, Stourbridge ...		cwt. 8 . lb.	0	2
Cobalt metal		oz.	2	6
,, Acetate, crystal		,,	1	6
,, ,, solution		,,	0	4
,, Carbonate ...		,,	1	0
,, Chloride, crystal		,,	0	7
,, ,, solution		,,	0	3
,, Nitrate, crystal		,,	0	8
,, ,, solution		,,	0	3
,, Oxide, pure ...		,,	2	6
,, Sulphate ...		,,	0	6
Copper, Wire or Sheet		lb.	1	6
,, Sheet, thin ...		,,	2	0
,, Filings ...		,,	2	0
,, Leaf ...		book	0	2
,, Foil (*Electrotype*)		lb.	5	0
,, Turnings (*Shavings*)		,,	1	6
,, Powder ...		,,	7	0
,, Acetate, crystal		,,	3	0
,, Ammon. Chloride		,,	2	0
,, ,, Sulph.		,,	2	0
,, Arseniate ...		,,	4	0
,, Arsenite, pure ...		,,	3	0
,, Carbonate ...		,,	2	0
,, Chloride, pure		,,	2	6
,, Oxychloride		,,	2	6
,, Nitrate, pure crystal ...		,,	1	6
,, Oxide (black)		,,	1	6
,, ,, *for organic Analysis*, grain		,,	4	0
,, ,, ,, ,, powder		,,	3	6
,, ,, Chertiers ...		,,	2	0
,, Phosphate		,,	5	0
,, Suboxide		,,	5	0
,, Sulphate ...	cwt. 30/	,,	0	4
,, ,, recryst. pure ...		,,	0	9
,, ,, purest ...		,,	1	3
,, Sulphide, fused ...		,,	2	6
Cotton Wool, bleached ...		,,	1	6
,, ,, best medicated ...		,,	2	6
Creasote, pure from wood ...		oz.	0	6
Cryolite		lb.	1	0
Dextrine (British Gum) ...		,,	0	4
Eikonogen Andresen's ...		,,	16	0
,, ,, 1 oz. bottles		oz.	1	4
Ether, Acetic		lb.	1	6
,, Ænanthic (*Oil of Cognac*)		oz.	4	0
,, Hydrochloric... ...		lb.	9	0
,, Petroleum		pint	1	0
,, Sulphuric, Methylic (sp. gr. ·730)		lb.	1	2

			s.	d.
Ether, Sulphuric, Methylic W.	Qt. about 4 lb.	lb.	1	0
,, ,, Rectified sp. gr. ·735	..	..	6	0
,, ,, ,, washed	..	..	7	0
Fehling's Test Solution ...		oz.	0	6
Feldspar		lb.	0	10
Flux, Black		,,	1	0
,, White		,,	1	0
Fluor Spar, lump or powder ...		,,	0	4
Fusible Metal (melts at 60° Cent.)		oz.	1	0
Galena		lb.	1	0
Gelatine, finest		,,	5	0
,, sheet		,,	2	6
Glass, powdered		,,	0	6
,, spun for filtering		oz.	2	0
Glucina		dram	3	6
Glucose (*Grape Sugar*)		lb.	0	6
Glue, Marine...		½ lb. tin	0	10
Glycerine, distilled, pure, sp. gr. ·1260		lb.	0	9
Glycin		oz.	2	0
Gold Leaf		book	1	9
,, Chloride, soln.		oz.	2	0
,, ,, crystals		...15 grains	1	10
,, Oxide		scr.	6	0
,, Wire or Foil		,,	6	0
Gum Arabic		lb.	2	6
,, Damar		,,	2	0
,, Shellac, best orange ...		,,	1	9
,, ,, powdered ...		,,	2	6
Gun Cotton		oz.	1	6
Gypsum, for casts		lb.	0	2
Hydrogen Peroxide, 10 Vol. ...		,,	0	10
,, ,, 20 ,, ...		,,	1	4
Hydroquinone		oz.	1	4
Indigo, best		,,	0	6
,, Sulphate, solution ...		,,	0	2
,, Paste		,,	0	3
,, Carmine		,,	1	6
Indigotine		dram	3	0
Iodine *crude*		oz.	1	2
,, Resublimed		,,	1	6
Iodoform		,,	1	6
Iridium		dram	35	0
,, Chloride		,,	20	0
Iron, Metal, Filings		lb.	0	6
,, Levigated		,,	1	1
,, Reduced by hydrogen ...		,,	3	6
,, Wire, for burning ...		bank	0	2
,, ,, pure, on reels ...		oz.	0	6
,, Acetate, solid		,,	0	6
,, Ammon-Citrate ...		lb.	2	1
,, Ammon-Sulphate ...		,,	0	6
,, Citrate and Quinine, 1 oz. bottles		oz.	1	0
,, Ferrocyanide		,,	0	6
,, Lactate		,,	0	4
,, Nitrate-per, solution ...		lb.	1	6
,, Oxalate...		,,	2	0
,, Oxide Red		,,	1	0
,, Peroxide (*Hæl magnetic*) ...		,,	1	6
,, Phosphate-per		,,	3	0
,, Perchloride, crystal subld. 1 oz. bottle			1	0
,, ,, solid ...		lb.	0	9
,, ,, solution ...		,,	0	4
,, Persulphate		,,	2	0
,, Protosulphate		,,	0	3
,, ,, pure ...		,,	0	6
Iron, Protosulphate, pure, Granular, special		lb.	1	6
,, Sulphide, fused		,,	0	4
,, ,, ,, rods ...		,,	0	7
Isinglass, finest Russian ...		oz.	2	0
,, Brazil		,,	0	8
Kaolin (China Clay)... ...		lb.	0	4
Lead, foil (*assay*)		,,	0	7
,, grain ...	28lbs 9d.	,,	0	10
,, Test Paper		book	0	2
,, Acetate		lb.	0	6
,, ,, pure		,,	0	10
,, ,, ,, Basic Solution		,,	1	6
,, ,, ,, ,, cryst.		,,	5	0
,, Carbonate		,,	0	6
,, ,, pure ...		,,	2	0
,, Chloride, pure ...		,,	1	6
,, Chromate, fused ...		,,	4	0
,, Nitrate		,,	0	5
,, ,, pure		,,	0	10
,, Oxide (litharge)	cwt. 35	,,	0	5
,, Peroxide		,,	2	6
,, ,, (*Puce*) pure ...		,,	1	0
,, Protoxide, Hydrate ...		,,	2	6
,, Red Oxide (*Minium*)	cwt. 35	,,	0	5
,, Sulphate, pure ...		,,	1	0
,, Tartrate		,,	3	6
Lepidolite		,,	1	6
Lime Cylinders (hard), in (sealed) tins,		doz.	2	0
Lithium, Metal		grain	2	6
,, Bromide		oz.	1	0
,, Carbonate... ...		,,	0	10
,, Chloride		,,	1	0
,, Iodide		,,	2	0
,, Oxide (*pure Lithia*) ...		,,	3	0
,, Sulphate		,,	0	9
Litmus		lb.	1	0
,, Paper, blue, doz. 1/2; best, doz. 2/; book			0	2
,, ,, red ,, 1/2; ,, ,, 2/ ,,			0	2
,, ,, neutral ,, 1/6 ,,			0	2
Lycopodium		oz.	0	3
Magnesium Wire or Ribbon, in hanks not less than 1 oz. ...		oz.	2	3
,, Wire		yard	0	1
,, Ribbon		,,	0	1
,, Filings		oz.	2	0
,, Citrate Granular, Eff.		lb.	1	9
,, Bromide... ...		oz.	1	1
,, Carbonate ...		lb.	0	8
,, Chloride, pure cryst.		,,	0	8
,, Nitrate, fused ...		,,	2	3
,, Oxalate		,,	4	0
,, Oxide (calcined) ...		,,	1	8
,, Phosphate, pure ...		,,	3	6
,, Ammon-Phosphate ...		,,	4	6
,, Sulphate, re-cryst. ...		,,	0	4
Manganese, Peroxide, cwt. 14/, 28lb, 2d.		,,	0	3
,, Granular, cwt. 14/, 28lb. 2d.		,,	0	3
,, Oxide Hydrate ...		,,	4	6
,, Carbonate, pure ...		,,	3	0
,, Chloride, pure ..		,,	1	6
,, Sulphate, pure ...		,,	1	6
Mannite		,,	6	0
Marble, white (Carrara) ...		,,	0	2
Marine Glue		½ lb. tin	0	10

		s.	d.
Mercury, Metal varies ...	lb.	2	6
,, Bicyanide	oz.	1	4
,, Bisulphide vermilion	,,	0	4
,, Chloride-bi ...	,,	0	4
,, Chloride-sub ...	,,	0	4
,, Iodide, Red ...	,,	1	0
,, Nitrate-proto ...	,,	0	6
,, Nitrate-per ...	,,	0	6
,, Nitric Oxide, Red ..	,,	0	5
,, Oxide, Orange ...	,,	0	6
,, Oxide, Black ..	,,	0	6
,, Phosphate ...	,,	1	4
,, Sulphate, for batteries, Grey	lb.	3	9
,, ,, Yellow ...	oz.	0	6
,, Sulphocyanide ...	,,	0	6
,, Sulphide	,,	0	5
Methylphenyl-diamene Hydrochlor	,,	1	6
Methyl Orange Indicator ...	,,	3	6
Methylated Spirit ... gal. 3/6,	pint	0	6
Metol	oz.	2	6
Microcosmic Salt	lb.	3	0
Morphia, pure cryst. .	oz.	10	0
,, Hydrochlorate ..	,,	7	0
Naphtha, Wood	pint	1	4
,, Dry, for Potassium .	oz.	0	2
,, Mineral	pint	0	8
Naphthaline, re-sublimed ...	lb.	0	9
,, re-cryst. ...	,,	2	6
Nickel, Metal, in cubes ...	oz.	0	5
,, Carbonate	,,	0	3
,, Chloride, pure cryst. ...	,,	0	3
,, ,, Solution ...	,,	0	2
,, Oxalate	,,	0	9
,, Oxide	,,	0	4
,, ,, pure	,,	1	6
,, Sulphate, crystal ...	,,	0	2
,, ,, Ammonio .	,,	0	2
Oil, Olive, best (pure) ...	lb.	1	3
,, Cloves	oz.	0	6
Oxygen, Composition ...	lb.	1	0
Palladium, Metal ... ...15 grains		6	6
,, Chloride, sol. ..	oz.	3	6
,, Nitrate, sol. ...	,,	3	6
Paraffin, Solid	lb.	0	8
Peptone, dry, best	oz.	1	3
Phenol-Phthaleine	,,	3	0
Phenylendiamin (Meta.) Chlor. ...	,,	1	6
Phosphorus... ... oz. 5d.,	lb.	3	6
,, Amorphous ...	oz.	0	6
,, Pentachloride ...	,,	0	9
Platinum, Wire or Foil (varies)...	,,	50	0
,, Sponge (varies) ...	dram	10	0
,, Bi-Chloride (varies) ...	oz.	24	0
,, ,, ,, 15 grain tubes		1	6
,, ,, solution (varies)	oz.	2	6
,, Black (varies) ...	dram	11	0
Plumbago, electrotype ...	lb.	1	8
Potash, American		0	6
Potassium, Metal ... oz. 6 ,	dr.	1	0
,, Caustic (stick) lb. 1/2,	oz.	0	2
,, ,, pure, by Alcohol	lb.	3	6
,, Solution, sp. gr. ·1270	,,	0	8
,, Acetate		1	4
,, ,, pure	,,	1	9
,, Antimoniate, pure, oz. 9d.. ..		8	0
,, Arseniate . ..		2	9
,, Arsenite		3	0
,, Bicarbonate, crystal... ..		0	8
,, Bichromate .. ,,		0	8

		s.	d.
Potassium, Bichromate, pure ...	lb.	1	6
,, Binoxalate ...	,,	2	0
,, Bisulphate, pure ..	,,	1	6
,, Bisulphite, cryst. 100	,,	3	0
,, Bitartrate	,,	1	9
,, Bromide, pure ...	,,	2	0
,, Carbonate ..	,,	0	6
,, ,, Dry ..	,,	1	0
,, ,, *for Analysis*	,,	2	0
,, Chlorate ...	,,	1	0
,, ,, pure ...	,,	2	0
,, Chloride, pure ...	,,	0	8
,, Chloro-Platinite dr. 6 ,	oz.	30	0
,, Chromate ...	lb.	1	6
,, ,, pure ...	,,	2	6
,, Citrate, neutral ...	,,	2	6
,, Cyanide (silver) ..	,,	2	0
,, ,, sticks, in 1 lb. bottles	,,	2	3
,, ,, (gold) ...	,,	4	0
,, ,, crystal, pure	oz.	1	2
,, Ferricyanide ...	lb.	2	6
,, ,, pure ...	,,	5	0
,, Ferrocyanide (Prussiate) Yellow	,,	1	2
,, ,, pure ...	,,	2	6
,, Fluoride .	oz.	0	8
,, Hyposulphate	,,	2	0
,, Hyposulphite ..	lb.	3	0
,, Iodide *varies*	oz.	1	3
,, Manganate ...	lb.	1	3
,, Molybdate ...	oz.	1	6
,, Nitrate	lb.	0	5
,, ,, pure .	,,	0	8
,, Nitrite ...	,,	2	6
,, Oxalate, neutral ...	,,	0	10
,, ,, ,, pure	,,	1	6
,, Permang., cryst. 7lb. 1/,	,,	1	2
,, Phosphate, pure ...	,,	4	0
,, Silicate, solution ...	,,	0	4
,, ,, white ...	,,	3	0
,, Sulphate ...	,,	0	6
,, ,, pure ...	,,	1	0
,, Sulphide (liver of Sulphur)	,,	0	8
,, Sulphite... ...	,,	3	0
,, Sulphocyanide ...	,,	2	6
,, Tartrate	,,	2	6
,, ,, and Soda (Rochelle Salts)	,,	1	6
,, and Sodium Carbonate, pure dry	,,	3	0
Pumice Stone	,,	0	6
Quinine Sulphate .. .	oz.	2	3
Rouge, Jewellers' ...	lb.	2	3
Rutile	,,	2	0
Saccharine	oz.	4	0
Salicine	,,	1	0
Santonine .	,,	10	0
Selenium	,,	7	0
Selenite	lb.	5	6
Shellac	,,	1	9
,, Powder	,,	2	6
Silica, crystal (*rock crystal*) ...	oz.	0	3
,, coml.	lb.	0	6
,, pure	,,	6	0
Silver (Assay) pure... ...	oz.	10	0
,, Leaf	book	1	0

			s.	d.
Silver, Granulated	oz		7	0
,, Precipitated	..		7	0
,, Acetate	..		7	6
,, Bromide	..		7	0
,, Carbonate	..		7	0
,, Chloride	..		5	6
,, Cyanide	..		6	0
,, Iodide	..		8	0
.. Nitrate, cryst. (varies) ...	..		3	0
.. ,, fused ,, ...	..		3	9
,, Oxide	..		6	6
.. Platinized Sheet ...	..		11	0
.. Sulphate	..		7	0
.. Wire or Sheet, pure ...	..		6	6
Soap Test (Wanklyn's) ...	..		0	5
,, Castile	lb.		0	8
Soda Lime, *for Organic Analysis*	..		1	4
.. Ash	cwt. 14/,	..	0	2
Sodium, Metal (per 1lb. tin 8/6),	oz.		0	9
.. Caustic, Lump 28lb. 4d.,	lb.		0	6
.. .. (stick) lb. 1/2,	oz.		0	2
.. .. powder 1 lb. tins			0	6
.. .. pure by Alcohol	lb.		3	0
.. ,, White, from Sodium	,,		12	0
.. Sol., sp. gr. ·1270	,,		0	8
.. Acetate, pure ...	,,		0	8
.. ,, fused ...	,,		1	3
.. Aluminate	,,		0	10
.. Amalgam ... (per 1lb. tin)	,,		9	0
.. Ammonio-Phosphate (Microcosmic Salt) ...	,,		3	0
.. Arseniate	,,		2	6
.. Arsenite	,,		3	0
.. Benzoate	,,		9	0
.. Biborate (fused glass of Borax)	,,		3	6
.. Bicarbonate... cwt. 30/,	,,		0	6
,, ,, pure ...	,,		0	10
.. .. ,, crystal	,,		1	0
.. Bichromate... ...	,,		0	8
.. Bitartrate	,,		3	0
.. Bisulphate	,,		1	3
.. Bisulphite	,,		1	3
.. ,, pure cryst., 100°	,,		1	6
.. Borate	,,		2	6
.. Bromide, pure dry ...	,,		4	0
.. Carbonate, crystal, pure	,,		0	8
.. ,, dry ...	,,		0	6
.. ,, ,, pure ...	,,		1	6
.. ,, pure dry (*for Analysis*) ...	,,		2	6
.. Chloride, purest ...	,,		0	8
.. ,, ,, fused ...	,,		2	3
.. Citrate, neutral ...	,,		3	6
.. Ferrocyanide ...	,,		4	0
.. Fluoride, pure ...	,,		8	0
,, Formiate, pure ...	,,		8	0
.. Hypochlorite, solution...	,,		0	10
.. Hyposulphite, cwt. 12/ 7lbs.	..		0	2
.. ,, pure ...	,,		0	6
,, Manganate, crude ...	,,		0	9
,, Molybdate	,,		1	6
,, Nitrate ... cwt. 18/6,	..		0	3
,, ,, pure ...	,,		0	8
,, Nitrite	,,		3	6
,, Nitroprusside, crystal ...	oz.		3	0
,, Oleate	lb.		3	0
,, Oxalate, pure ...	,,		2	0
.. Permanganate, cryst. pure	oz.		2	0
.. Phosphate	lb.		0	6
,, ,, pure ..	,,		0	8

			s.	d.
Sodium, Potassio-Tartrate ...	lb.		1	6
,, Salicylate, Artificial ...	oz.		0	10
.. Silicate (*water glass*), cwt. 12/,	lb.		0	1
.. Stannate	,,		1	6
.. Sulphate ... cwt. 11/,	,,		0	2
.. ,, pure ...	,,		0	6
.. Sulphite cwt. 20/, 1 lb. bots.			0	4
.. ,, pure ...	lb.		1	1
.. Sulphide, cryst. ...	,,		1	6
.. Tartrate	,,		2	6
.. Tungstate	,,		1	4
.. and Potassium Carb. pure dry	,,		3	0
Starch, pure	oz.		0	2
,, Paper .	book		0	2
Stearine...	lb.		1	6
Strontium	grain		3	6
.. Carbonate, pure .	lb.		1	6
,, ,, native ...	,,		0	6
.. Chlorate	..		6	0
.. Chloride, crystal ...	,,		1	6
.. ,, fused ...	..		3	0
.. Nitrate, pure ...	,,		1	2
.. ,, dried ...	..		0	6
.. Oxide	,,		5	0
,, Sulphate, pure ...	,,		1	3
Sugar of Milk (Lactose) ...	,,		1	3
Sulphur, roll	,,		0	3
,, Sublimed	..		0	3
,, pure, crystal ...	,,		2	0
.. Precipitated ...	,,		1	0
Solution in Glycerine (*see Acids*)				
Tannin, pure	lb.		3	0
Tellurium ...	15 grains		4	0
Thallium	oz.		6	6
Theine	,,		1	6
Theobromine . .	dr.		1	0
Tin, Granulated ...	lb.		2	3
,, Foil... ..	.. 1/6 & ,,		2	6
,, Perchloride, fuming ...	oz.		1	3
,, Bisulphuret (*Aurum Musivum*)	lb.		9	0
,, Chloride, ordinary, cryst. ...	..		1	0
,, ,, pure, *for Analysis*	,.		2	0
,, Oxide, grey	..		2	0
,, ,, pure	..		3	0
,, Powdered, pure ...	,,		5	0
Tincture Brazil Wood ...	oz.		0	4
.. Cochineal	..		0	6
.. Galls	..		0	3
.. Hæmatine	..		0	4
.. Iodine	..		0	6
,, Litmus	..		0	2
,, Soap	..		0	6
,, Turmeric	..		0	4
Toluol	lb.		1	6
Tripoli Powder	..		2	3
Tungsten, Metal ..	oz. 1/, ..		12	0
Turmeric Paper ..	doz. 1/3, book		0	2
Turpentine	lb.		0	6
.. Distilled	,,		0	10
Uranium, Acetate	oz.		2	0
,, Nitrate ...	,,		1	6
,, Oxide, orange ...	..		2	0
,, ,, black ...	..		2	6
,, Sulphate	..		2	6
Urea, pure crystal	,,		2	0
,, Nitrate, pure	,,		2	0

			s.	d.
Vanadium, Chlor. Soln.	...	oz.	1	6
Vaseline ...	... (1 lb. tin 1 4)	,,	0	2
Water, Distilled, pure, Carboy 10 gal.	3d. gal.		0	1
Wax, Bees'	... ...	lb.	2	6
,, White		,,	3	0
Xylol purified	..	,,	3	6
Zaffre ...		oz.	0	6
Zinc, Granulated	...	lb.	0	5
,, Foil		oz.	0	1

		s.	d.
Zinc, Sheet	... ...	lb.	0	7
,, Dist. free from Iron and Arsenic		..	1	0
,, Purified, Rods...	...	.	1	3
,, Powdered	... ...	..	2	0
,, Acetate	...	..	1	6
,, Carbonate	...	..	1	9
,, Chloride, pure, in sticks	...	..	2	6
,, Nitrate	...	..	2	0
,, Oxide		.	1	0
,, Phosphate		..	1	0
,, Sulphate, cryst.		..	0	4
,, ,, pure	...	..	0	8

The Reagents described above as "Pure for Analysis," are prepared from pure materials with the utmost care.

Test Solutions for Wanklyn's Water Analysis, prepared specially and of guaranteed accuracy.

		s.	d.
Nessler Test	.per litre	10	0
Standard Ammonia	,,	5	0
Permanganate ...	.. ,,	10	0

		s.	d.
Standard Nitrate Silver	. per litre	5	0
Standard Soap Test	... ..	8	0

Test Solutions for Wanklyn's Moist Combustion Process.

We have purchased from Professor WANKLYN the Formulæ and rights to supply the Test Solutions mentioned by him in the 7th Edition of his Work, page 54.

		s.	d.
Permanganate Solution	.. per litre	6	0
Iron Protosulphate	... ,,	6	0

		s.	d.
Potass Caustic Solution	... per litre	6	0
Sulphuric Acid	.. ..	6	0

Dyeing Materials for Experiments.

		s.	d.
Annatto ...	... lb.	5	0
Brazil Wood	..	0	6
Carmine ..	oz.	3	0
Cochineal	lb.	2	6
Cutch Catechu	..	2	0
Cudbear ...	..	2	0
Ebony Chips	..	1	6
Fustic Chips	..	0	6
Galls ...	..	2	0
Gamboge Gum	.. ..	6	0
Garancine	... ... oz.	0	4

		s.	d.
Indigo, Spanish	.. .. lb.	6	0
Logwood...	..	0	3
,, Extract	... .. ,,	1	0
Madder ...	... ..	1	0
Persian Berries	. oz.	0	3
Safflower...	.. ..	0	4
Saffron	..	4	0
Shumac ...	.. .. lb.	0	6
Sanders, Red	.. ,,	1	0
Turmeric Root	..	0	6
,, ,, Powder	..	0	10

PRICES are NETT, and subject to Market Variations.

SPECIAL QUOTATIONS GIVEN FOR QUANTITIES.

ACIDS.

MINERAL ACIDS, AMMONIA FORT ·880 AND INFLAMMABLES.

As it is necessary to declare the above at the time of delivery, either to Carrier, Railway, or for Export, they cannot be packed with other Goods, but must be delivered at the Depots on certain days, according to the arrangements of the Railway Company by which they are to be forwarded.

The most convenient form for Acids is in Stoppered Winchester Quarts, packed in cases containing either 4, 6, or 12 divisions.

Average weight of Winchester Quart Sulphuric Acid, 10-lb.
" " " Nitric Acid, 7½-lb.
" " " Hydrochloric Acid, 6½-lb.
" " " Ammonia fort ·880, 4½-lb.

N.B.—Sulphuric and Nitric Acids must be packed separately.

PURE STANDARD SOLUTIONS for VOLUMETRIC ANALYSIS.

Prepared by Messrs. F. SUTTON & CO., Norwich.

In best quality stoppered bottles, free from Lead, and perfectly air-tight.
The exact working strength of each solution is noted on the label of each bottle.

FRANCIS SUTTON & CO. have a Special Laboratory under the direction of Mr. SUTTON for the preparation and testing of these Solutions, and every precaution is taken, by constant analysis and verification of the standards, to ensure the greatest accuracy obtainable. They are aware that some manufacturing chemists are offering to supply Solutions at much lower prices than themselves, but it must be evident to anyone that the constant exact supervision, extending to the testing of every Solution before being sent out, and the great personal care required at every point, requires adequate remuneration. It must also be allowed that in a laboratory where constant exact analysis is being carried on there is much greater safety than can be secured in the warehouses of dealers who are not scientific chemists, and who frequently rely upon the so-called purity of German chemicals for their standards, without any systematic verification by actual experiment.

SPECIAL SOLUTIONS FOR TECHNICAL OR SCIENTIFIC PURPOSES are arranged as required, on any system of measurement, and the price charged will be as reasonable as is consistent with the trouble involved.

For the Titration of Acids. Alkalies, Alkaline Products, Soaps, &c.

	Per Litre 1 bottle. 9d.	Per 4 Litres in 2 bottles. 1/6
Normal, Seminormal, or Decinormal Pure Potash, Soda, or Ammonia, either as Caustic or Carbonate, c.c., dm., or septems	4	12
Ditto Sulphuric, Nitric, Hydrochloric, or Oxalic Acid	3	10/6
$\frac{N}{10}$ Caustic Baryta	4	12
Standard Sulphuric Acid, 100 dm. or 1000 grn. = 100 grn. Soda (Na_2O) ...	5	16
Normal Ammonio-Copper Solution for Acetic Acid, &c.	5	16
Standard Sulphuric, Nitric, or Hydrochloric Acid, 1 c.c. or dm. = 0·01 gm. or 0·1 grn. NH_3 in gas liquor, &c.	1	12
Standard Soda, Potash, or Ammonia, 1 c.c. or dm. = 0·01 gm. or 0·1 grn. NH_3	4	12
Standard Hydrate of Lime	2/6	8

For Miscellaneous Metals, Ores, Combined Acids, Salts, &c.

$\frac{N}{10}$ Permanganate, Thiosulphate, Thiocyanate, Bichromate, or Iodine	4	14
$\frac{N}{10}$ Silver Nitrate	7/	25
$\frac{N}{10}$ Sodic Chloride for Silver, &c.	4/	14/
$\frac{N}{10}$ Alkaline Arsenite for Chlorine and Bleach	4/	14/
Standard Copper Solution for colour testing	4/	14/
Standard Iron ditto	4/	14/
Standard Sodic Sulphide for Copper, Zinc, Lead, &c.	5	16/
Standard pure Stannous Chloride (variable)	5	16
Standard Iodide of Starch	5	16/
Standard Potassic Iodine for Mercury	5	16
Standard Potassic Cyanide for ditto	5	16
$\frac{N}{10}$ Mercuric Chloride	4	14
Standard Potassic Cyanide for Copper	4/	14
Standard Copper Solution	4/	14/
Standard Salt for assaying Silver	4/	14/
Standard Silver for ditto	5/	16
Standard Salt for Photographic Baths	4/	14
Standard Silver for ditto	5	16/
Standard Bichromate and Hyposulphite for Lead	4	14/
Standard Lead Solution	4/	14
Standard Bichromate and Iron for Manganese	4/	14
Standard Ferrocyanide of Zinc	4/	14
Standard Zinc Solution	4/	14/
$\frac{N}{1}$ $\frac{N}{2}$ or $\frac{N}{10}$ Ferric Chloride	4	14/
Standard Uranium Acetate for Arsenic Acid	10	35
Standard Uranium for Bismuth	12	4
Standard Sodic Phosphate for ditto	5	16/
Normal Baric Chloride for SO_3...	4/	14/
$\frac{N}{2}$ Potassic Bichromate for ditto	4/	14
Standard Permanganate for Tannin	5	16
Indigo Carmine for ditto	5	16
Solution of Gelatine for ditto	5	16
Standard Silver Nitrate for Zinc Analysis	15/	40/
Standard Ammonic Thiocyanate for ditto	5/	16/
Standard Copper Solution for Sulpho-cyanides (Barnes' process)	5	16
Solution of Sodic Bisulphite for ditto	3/	10/6
$\frac{N}{2}$ Alcoholic Solution of Potash or Soda for Oils and Fats ...	20/	70/
Ditto, Methylated	10	30/
Standard Alcoholic Iodine for ditto	20/	70/

For Technical Gas Analysis and Gas Products.

	Per Litre 1 bottle. 9d.	Per 4 Litres in 2 bottles 1/6
Referee's Standard Sulphuric Acid for Ammonia in Coal Gas	4/ ...	11
Referee's Standard Ammonia, Potash, or Soda	4/ ...	11
Wills' Standard Sulphuric Acid for Gas Liquor...	3/ ..	10 6
Ditto Ammonia, Potash, or Soda	3 ...	10 6
Ditto Saturated Caustic Soda	5/ ...	16/
Standard Baryta Solution for CO_2, 100 c.c.=0·15 grn. CO_2 .	1/ ..	14
Standard Sulphuric Acid and Caustic Soda for Gas Liquor	4/ ...	14

Standard Gas Normal Solutions (Sutton's process).

So arranged that 1 c.c.=1 c.c. of each gas at 760°, 0°, and dry.

Standard Sulphuric Acid for Ammonia	4/	11
Standard Caustic Potash of same strength	1/	11
Standard Baryta for CO and CO_2	4/ ..	11
Standard Oxalic Acid to correspond	4/ .	11
Standard Arsenious Acid for Cl	4/ ..	11
Standard Iodine to correspond...	4/	14
Standard Lead for H_2S	4/ ..	14/
Standard Silver Nitrate for HCl	4/ .	14
Standard Ammonic Thiocyanate	4/ .	14
Standard Potassic Hydrate	4/ .	14
Standard Oxalic Acid for CH_4...	4/ .	14
Standard Baryta for CH_4	4/ .	14
Standard Potassic Permanganate for N_2O_5	4 .	14/
Standard Iodine for SO_2	4 .	14
Standard Caustic or Carbonate of Soda for Vitriol Chamber exits, Chimney Gases, &c., and corresponding Acids	4/ .	14/

For Phosphoric Acid, Phosphates, Manures, &c.

Standard Uranic Acetate, 1 c.c.=0·005 gm. or 0·05 grn. P_2O_5	10/ ...	30/
Ditto=0·01 gm. or 0·1 grn. Tricalcic Phosphate	10/ ...	30/
Standard Sodic or Ammonio-Sodic Phosphate	4/ ..	14
Standard Calcic Phosphate	4/ ..	14
Acetic Solution of Sodic Acetate	2/6 ..	8
Standard Molybdic Solution for Pemberton's process	5/ ...	16
Molybdic Solution for separation of P_2O_5	4 ...	14
Strong Ammonic Nitrate Solution 75%	5 ..	16
Weaker ditto 10%	2/6 .	6
Magnesia Mixture for precipitating P_2O_5	4/ ..	14
Dilute Pure Sulphuric Acid 5%	2/6 ...	8
Solution of Bismuthic Nitrate for P_2O_5	5/ ...	16
Solution of Ammonio-Magnesic Citrate (Joulie)	6/ ...	20
Solution of Ammonic Citrate sp. gr. 1·09	6/ ...	20

For Sugar Analysis.

	Per Litre 1 bottle. 9d.		Per 4 Litres in 2 bottles 1/6
Copper Solution (Fehling's process). In separate bottles, which, mixed in equal proportions, form Fehling Solution, 1 c.c. = 0·005 grm. Sugar	8	...	25/
Alkaline Tartrate from purest materials			
Knapp's Standard Mercuric Cyanide	10/	...	35/
Sachsse's Standard Mercuric Iodide	10/	...	35/
Dr. Pavy's Ammonio-Cupric Solution	5	...	16/
Concentrated Sub-acetate of Lead	7/	...	20/
Pure Aluminic Hydrate, suspended in distilled water	5	...	16/
Pure Acid Sulphate of Soda for removing excess of Lead...	5	..	16/

For Analysis of Urine.

$\frac{N}{10}$ Silver Nitrate for Chlorides...	7/	...	25/
$\frac{N}{10}$ Ammonic Thiocyanate ditto	5	...	16/
Standard Mercuric Nitrate (Liebig) for ditto	7	...	25/
Standard Mercuric Nitrate (Liebig) for Urea	7	..	25/
Baryta Solution for removing P_2O_5 and SO_3	4/	...	14/
Hypobromite Solution for Urea	7	...	25/
Uranic Acetate or Nitrate for Phosphates	10	..	35/
Standard Phosphate Solution	5	...	16/
Acetic Sodic Acetate Solution for ditto	2/6	...	8/
Standard Baric Chloride for SO_3	4	...	14/
Sodic Sulphate Solution for ditto	2	...	6/
Fehling Solution, in separate bottles, for Sugar	8	...	25/
Dr. Pavy's Concentrated Copper Solution for ditto	8/	...	25/
Ditto, mixed with Ammonia	5	...	16/
Ferrocyanide Solution for Albumen	4	...	14/

Volumetric Solutions of the British Pharmacopœia.

Potassic Bichromate	4/	...	14/
Sodic Hyposulphite...	4/	...	14/
Iodine	4/	...	14/
Silver Nitrate	7/	...	25/
Oxalic Acid..	4/	...	14/
Caustic Soda...	4/	...	14/

For Analysis of Waters, Beers, &c.

Sensitive Nessler Test	10/	...	30/
Standard Ammonia Solution, 1, $\frac{1}{10}$, or $\frac{1}{100}$ mgm.	3/	...	10/3
Distilled Water, free from NH_3 and organic matter	2/	...	6/
Solution of Pure Soda for Nitrates by Aluminium 10%	5/	...	16/
Standard Potassic or Sodic Nitrite	6/	...	20/
Standard Silver Nitrate for Cl (Frankland)	4/	...	14/
Standard ditto, 1 c.c. = 1 mgm. or 1 dm. = 0·01 grn. Cl	4/	...	10/6
Standard Water for hardness (Clark)	4/	...	10/6
Standard Calcic Solution for hardness (Frankland)	4/	...	10/6
Ditto (Wanklyn)	4/	...	10/6
Clark's Standard Soap Test	8/	...	25/
Wanklyn's Standard ditto	8/	...	27/

	Per Litre 1 bottle. 9d.	Per 4 Litres in 2 bottles. 1/6
Tichborne's Standard Soap Test	10/ ...	35/
Standard Potassic Nitrate for Indigo process	4 ...	14/
Standard Indigo Solution from purest Indigotin	10 ...	35/
Ditto weak ditto	6/ ...	20/
Standard Permanganate for Water (Oxygen process)	3/ ...	10/6
Standard Hyposulphite for ditto	3 ...	10/
Alkaline Permanganate for Albumenoid NH_3	10/ ...	30/
Standard Water of 8° hardness	3 ...	10/6
Solution of Zinc Iodide and Starch for Nitrites	5/ ...	16
Standard Ammonia sp. gr. 0·9986 for acidity in Beer	2 6 ...	7 6
Phenol Sulphuric Acid for Nitrates	10/ ...	30
Carbazol Solution for ditto	10/ ...	30/
Silver Sulphate Solution for ditto	6/ ...	20
Alumina Sulphate ditto	3/ ...	10/
Schützenberger's Hyposulphite Solution	6/ ...	20/
Indigo Carmine ditto...	10/ ...	30/

Pure Test Solutions of various kinds for qualitative analysis at moderate prices.

Half-litres of Standard Solutions are uniformly charged 6d. extra beyond the proportionate price per litre.

Indicators.

	Per 1-oz. crkd. bot. 2d. stopd. bot. 6d.	Per 5-oz. crkd. bot. 2d. stopd. bot. 6d.	Per 20-oz. stopd. bot. 6d
Ordinary Litmus Solution, which keeps good in closed bottles	6d. ...	2/ ...	5/
Special Pure Litmus Solution from extract, ditto	9d. ...	3/ ...	10/
Ditto, with Glycerine	1/ ...	3/ ...	10/
Lacmoid Solution...	9d. ...	2/ ...	7/6
Methyl Orange Solution, special quality	6d. ...	1/6 ...	4/
Phenolphthalein Solution	6d. ...	1/6 ...	4/
Phenacetolin Solution	1/ ...	3/ ...	10/
Alcoholic Cochineal Solution	6d. ...	2/ ...	7 6
Rosolic Acid or Corallin Solution	6d. ...	2/ ...	5/
Starch Solution, fresh filtered	...	1/ ...	2/6
Ditto, Concentrated, and prepared to keep	6d. ...	1/6 ...	5/
Potassic Chromate Solution for Silver and Chlorine	6d. ...	1/ ...	2/
Ferric Sulphate Solution for Thiocyanate	6d. ...	2/ ...	5/
Potassic Ferrocyanide for Iron	6d. ...	1/ ...	2
Potassic Ferrocyanide for Uranium	6d. ...	1/ ...	2/
Alkaline Stannous Chloride	6d. ...	2/ ...	7/6
Ferric Chloride for Zinc	6d. ...	1/6 ...	5/
Metaphenylene Diamine for Nitrites	1/ ...	4/ ...	12
Naphthylamine Hydrochloride	1/ ...	4/ ...	12

Iodized Starch Paper in bottle, 1/6

Special Test Papers.

These Papers are bound in books of 24 leaves in such a manner that they cannot become loose. The reacting agents are of the purest character, even in colour, and very sensitive, and the paper used is unsized and calendered so as to have a fine surface.

Price per book 3d., or one dozen books, either of one sort or assorted kinds, for 2 6, post free, comprising Blue Litmus, Red ditto, Neutral ditto, Red Lacmoid, Blue Lacmoid, Phenolphthalein, Neutral Turmeric, Alkaline Turmeric, and Lead Acetate.

FLETCHER, RUSSELL & CO.'S

CHEMICAL

Gas Apparatus.

SOLD BY

TOWNSON & MERCER,

89, BISHOPSGATE STREET WITHIN,

LONDON.

CLASSIFIED LIST OF BURNERS.

The following Classified List gives the gas consumption, approximate power in boiling water in quarts per hour, and general details of some of the ordinary stock patterns of burners. These are, by no means, all we make, but they are the ones most generally in demand. The use of the List will be at once seen in selecting any burner for any specified work by the number of quarts of water per hour which any burner will boil. This may be taken as an average, but the result will vary with different qualities of gas, and also with the shape, weight, and material of the vessels used.

	Quarts of water boiled per hour in a light copper vessel.	Price complete with Stand.	Height with Stand.	Width of support for vessels.	See page	Gas supply pipe required.	Price without support for vessels.	Maximum gas consumption at 1 inch pressure.
Colonial Hot plate, C 10	10	5/6	3¾ in.	11 in.	496	⅜ in		10ft.
,, ,, C 14	14	12/-	3¾ in.	11 in.	496	⅜ in		14ft.
,, ,, C 24	24	17/6	3¾ in.	11 in.	496	½ in		24ft.
,, ,, C 28	28	22/6	..	..	496	½ in		28ft.
,, ,, C 48	48	37/-	..	..	496	½ in		48ft.
,, ,, C 46	46	42/6	..	..	497	½ in		46ft.
,, ,, C 83	83	62/-	..	..	497	⅝ in		83ft.
Twin, No. 12	12	7/6	4in.	13½ by 6½	498	⅜ in		12ft.
,, ,, 18	18	9/6	4¼ in.	17¼ by 8½	498	⅜ in		18ft.
Twin Hot-plate, No. 24	24	22/-	4in.	15 by 13½	498	½ in		24ft.
,, ,, ,, 36	36	27/6	4¼ in.	18½ by 17¼	498	½ in		36ft.
,, ,, ,, 42	42	35/-	4¼ in.	24¼ by 17¼	498	½ in		42ft.
Standard High Power Concentric No. 20	20	10/6	6½ in.	4½ in.	499	½ in		20ft.
,, ,, ,, 40	40	17/6	6½ in.	8½ in.	499	⅝ in		40ft.
,, ,, ,, 60	60	25/-	6½ in.	13½ in.	499	¾ in		60ft.
,, ,, ,, 100	100	38/-	6½ in.	18¾ in.	499	1in		100ft.
The above four combined	220	£5 4/-	6½ in.	18¾ in.	499	1½ in		220ft.
Standard Star Burner No. 5	5	2/6	4in.		499	⅜ in		5ft.
,, ,, 10	10	3/-	4½ in.		499	⅜ in		10ft.
,, ,, 15	15	3/3	5¼ in.		499	½ in		15ft.
,, ,, 20	20	4/3	5¾ in.		499	½ in		20ft.
Standard Burner, No. 10	10	1/10	3in.	5½ in.	500	⅜ in		10ft.
,, ,, 15	15	2/6	3in.	7in.	500	⅜ in		15ft.
,, ,, 20	20	3/9	3in.	8½ in.	500	⅜ in		20ft.
,, ,, 30	30	10/6	3in.	10 in.	500	½ in		30ft.
Duplex Radial, No. 7	7	1/9	2½ in.	5¼ in.	501	⅜ in		7ft.
,, Star ,, 8	8	1/9	2½ in.	5¼ in.	501	⅜ in		8ft.
,, Radial ,, 9A	9	2/3	3¼ in.	6¼ in.	501	⅜ in		9ft.
,, Star ,, 10A	10	2/3	3¼ in.	6½ in.	501	⅜ in		10ft.

CLASSIFIED LIST OF BURNERS.—*Continued.*

	Quarts of water boiled per hour in a light copper vessel.	Price complete with Stand.	Height with Stand.	Width of support for vessels.	See page	Gas supply pipe required.	Price without support for vessels.	Maximum gas consumption at 1 inch pressure.
Duplex Radial, No. 9	9	3/-	3½ in.	6¾ in.	501	⅜in.	1/6	9ft.
,, Star ,, 10	10	3/-	3½ in.	6¾ in.	501	⅜in.	1/6	10ft.
,, Radial ,, 11	11	4/-	4 in.	7⅜ in.	501	⅜in.	1/10	11ft.
,, Star ,, 12	12	4/-	4 in.	7⅜ in.	501	⅜in.	1/10	12ft.
,, Radial ,, 15	15	5/-	3½ in.	10 in.	501	⅜in.	2/6	15ft.
,, Star ,, 16	16	5/-	3½ in.	10 in.	501	⅜in.	2/6	16ft.
,, Radial ,, 23	23	14/6	3½ in.	10¾ in.	501	½in.	8/8	23ft.
,, Star ,, 26	26	14/6	3½ in.	10¾ in.	501	½in.	8/8	26ft.
8R	12	2/-	3½ in.	6 in.	502	⅜in.	1/6	12ft.
SR	12	4/6	3⅞ in.	6½ in.	501	⅜in.	3/-	12ft.
LR	20	6/6	4 in.	7½ in.	501	⅜in.	4/-	20ft.
10S		2/-	2⅝ in.	3½ by 4½ in	502	⅜in.		13ft.
14S		3/6	2⅝ in.	3½ by 9in.	503	⅜in.		18ft.
Horizontal Star	10		1 in.		510	⅜in.	2/-	10ft.
Drip-proof Star	14	3/6	3 in.	4 in.	504	⅜in.		14ft.
Safety Bunsen, ⅞in.	5	4/-	4⅜ in.		504	¼in.	1/9	5ft.
,, ,, 1⅛in.	10	4/6	5⅛ in.		504	⅜in.	2/3	10ft.
,, ,, 1½in.	14	5/9	7 in.		504	⅜in.	3/-	14ft.
Safety Bunsen, Cluster of 4	40		6 in.		504	½in.	13/-	40ft.
,, 7	70		6 in.		504	¾in.	20/-	70ft.
,, 12	120		6 in.		504	1in.	33/6	120ft.
Bunsen, ⅜in.	3	2/2	4½ in.		505	¼in.	7d.	3ft.
,, 7/16in.	5	2/2	5¼ in.		505	¼in.	9d.	5ft.
,, ½in.	6	2/6	6 in.		505	⅜in.	10d.	6ft.
,, ⅝in.	8	3/-	7 in.		505	⅜in.	1/-	8ft.
,, ¾in.	12	4/-	8 in.		505	⅜in.	1/6	12ft.
New Laboratory Bunsen		2/6	5½ in.		505	¼in.		4ft.
New Standard Rose Bunsen, No. 5	5	4/-	5 in.		506	¼in.		5ft.
,, ,, 10	10	4/6	6 in.		506	⅜in.		10ft.
,, ,, 15	15	5/9	7 in.		506	⅜in.		15ft.
Argand Bunsen, ½in.	3	3/-	3½ in.	5 in.	506	¼in.	2/3	3½ft.
,, ,, ¾in.	7	3/9	4 in.	5½ in.	506	⅜in.	2/9	7ft.
High Power, No. 3	25	6/-	4 in.	6 in.	508	⅜in.	4/-	25ft.
,, ,, ,, 4	40	8/-	5 in.	8 in.	508	½in.	6/3	40ft.
,, ,, ,, 6	90		4½ in.		508	¾in.	12/6	90ft.
,, ,, ,, 8	200		6 in.		508	1¼in.	26/-	200ft.
Drip-proof High Power No. 25	25				509	½in.	6/-	25ft.
,, ,, 40	40				509	⅝in.	10/-	40ft.
,, ,, 60	60				509	¾in.	16/6	60ft.
,, ,, 90	90				509	¾in.	19/-	90ft.
,, ,, 200	200				509	1in.	33/6	200ft.
Concentric	53				509	⅝in.	30/-	53ft.

Rules for the selection of apparatus for special purposes, and hints as to management will be found in "Coal Gas as a Fuel," by Thos. Fletcher, F.C.S.

Price 1s., post free.

F. R. & CO.'S NEW SERIES COLONIAL PATTERN HOT PLATES FOR BOILING.

These are designed specially for use where gas is high in price, to obtain the greatest possible economy in practice. The boiling burners with the centre star can be turned low enough to keep the smallest pan gently simmering without waste. The three concentric burners will either boil 30 or 40 pints of water rapidly, or keep a half-pint pan slowly simmering.

The single, double, and triple concentric burners are all interchangeable, and any size of the hot plates can be supplied to order, with other powers of burners to suit any special class of work, at proportionate prices. The whole of these patterns are simple, strongly made, easily cleaned after the dirtiest work, entirely made of brass and cast iron, and with all parts interchangeable in case of accident. The burners are of the highest class and perfect in every detail, giving very high duties for the gas consumed.

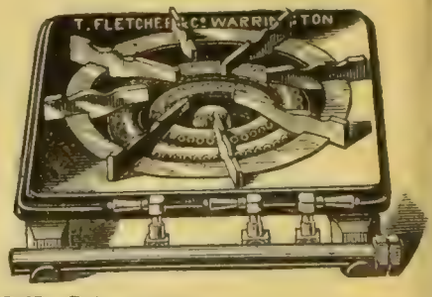
The number in each case gives the maximum total gas consumption of the whole of the burners at once at ordinary day pressure, and also approximately the number of quarts of water which can be boiled per hour in light wide copper vessels.

These hot plates are an extension of the series of "Standard" burners, which are now so well and so largely known from their perfection in form and the high duty obtained in use.

Prices:—

C 10 Hot Plate, single ring, no tap **5/6**
C 14 „ double concentric burner, 2 taps **12/-**
C 24 „ triple concentric burner, as engraved, with 3 taps **17/6**

All the above are the same size, 11in. wide, 13in. back to front, 3¾in. high.

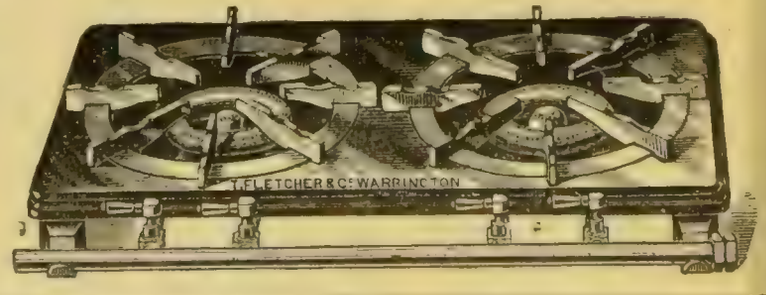


Porcelain Enamelled **C 14 1/3** extra; **C 24 2/-** extra.

C 28 Hot Plate, 2 double concentric burners and 4 taps, **22/6.**

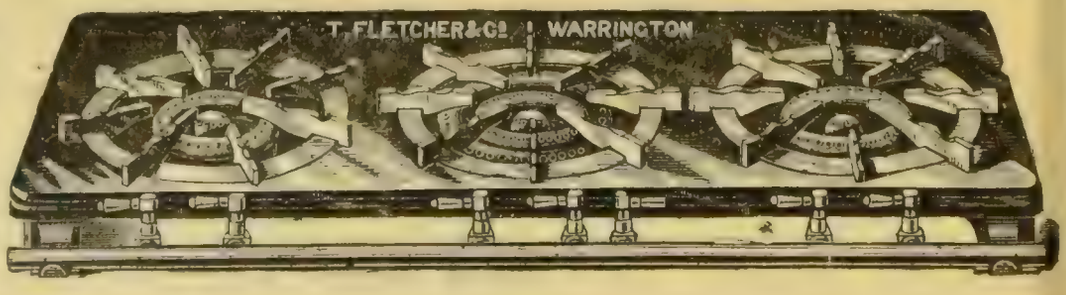
C 28 Hot Plate, 2 single burners and 2 taps, **17/-.**

Size 22in. wide, 13in. back to front, 3¾in. high.



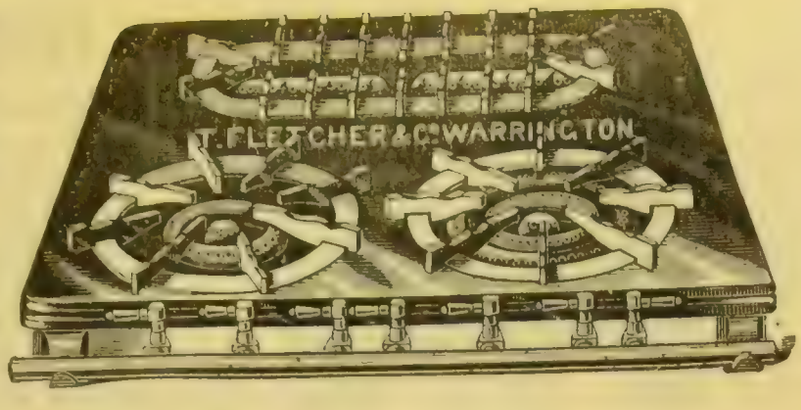
C 48 Hot Plate, 3 burners, two double, and one triple concentric, **37/-.**

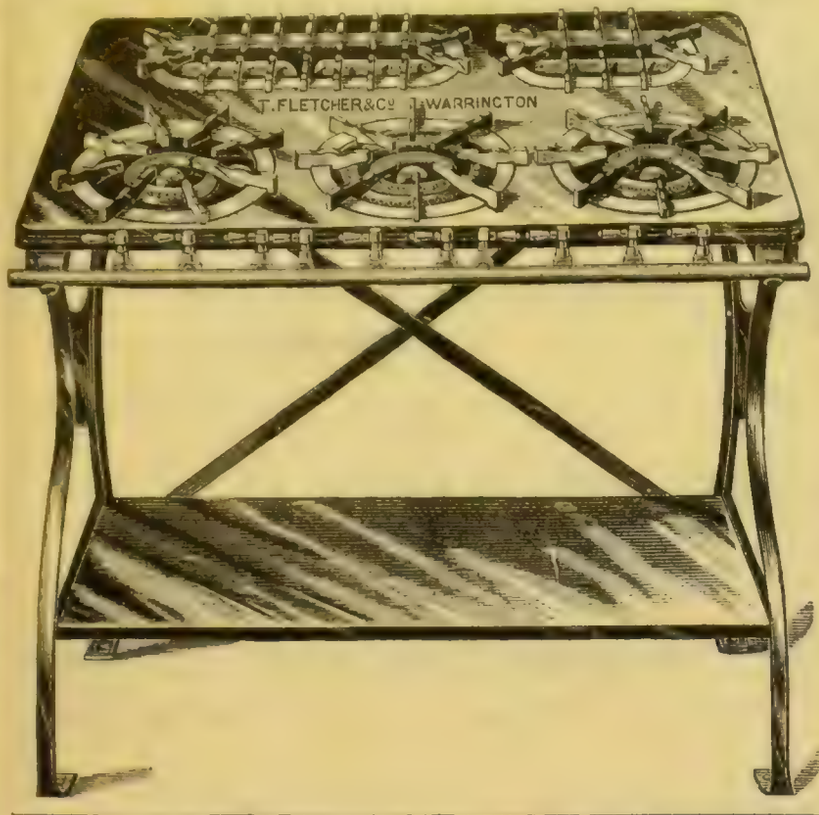
Size, 33in. wide, 13in. back to front



C 46 Hot Plate, 4 burners, one double and one triple concentric rings and two straight burners which can be used together for fish kettles, or separately for pans, smoothing irons, &c., **42/6.**

Size, 22in. wide, 23in. back to front. If fitted on cast-iron stand, table height, with shelf under, as engraved below, **30/-** extra.





C 83 Hot Plate, 6 burners, two double and one triple concentric, with three straight burners, two of which can be used together for fish kettles, or each can be used separately for boiling pans, smoothing irons, &c. Price **62/-.**

Size, 33in. wide, 22in. back to front.

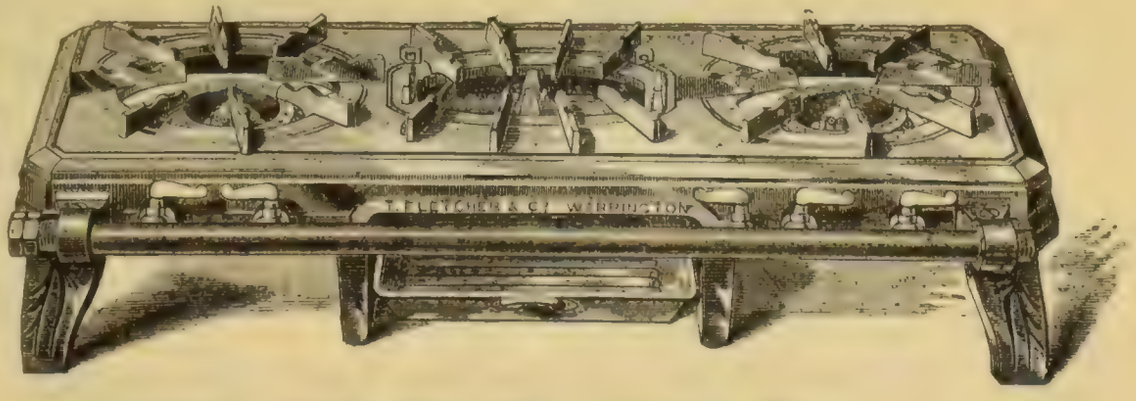
If fitted on cast-iron stand, table height, with shelf under, as engraved, **30/-** extra.

The above hot plates have no side projections, which enables them to be fixed and used side by side, in any number, as a continuous hot plate.

NEW COLONIAL GRILL AND HOT PLATE.

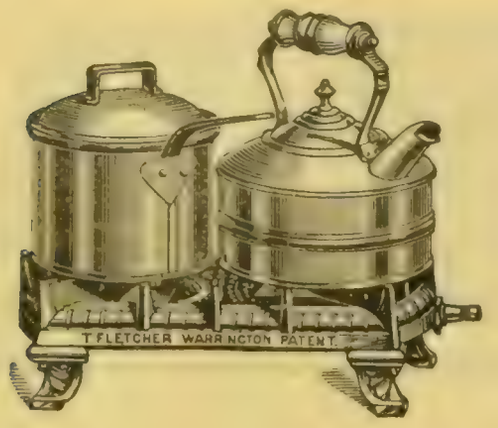
This is similar to the well-known Colonial Hot Plates, but has a combined toaster, grill, and boiling burner in the centre.

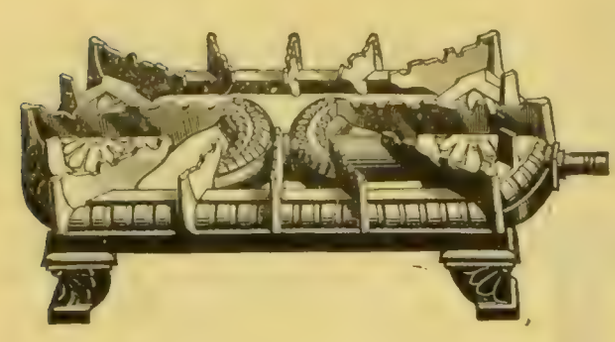
The stock pattern has wrought-iron supply pipe, one double concentric and one single burner, in addition to the grill If with two double concentric burners as engraved, and with strong polished brass supply pipe, **8s. extra.**



Colonial Grill, No. 37. Price, 28s.

Size, 27½ in. long; 13 in. deep; 6¾ in. high.





PATENT TWIN BURNERS.

These burners are a valuable improvement over any others for ordinary domestic use. One burner will with one gas supply boil EITHER ONE OR TWO PANS AT ONCE, without waste, and without the gas running up between and being half wasted, as it is when two pans are placed over an ordinary circular burner. The stands are made specially to carry one or two pans safely in any position. If one pan is placed over one end of one of the burners, it can be kept gently simmering, whilst all the remaining power is used for boiling the other pan.

Size No. 12 will boil one pan any size, or two not exceeding 8in. diameter.

Price 7/6.

Size No. 18 will boil one pan any size, or two not exceeding 10in. diameter.

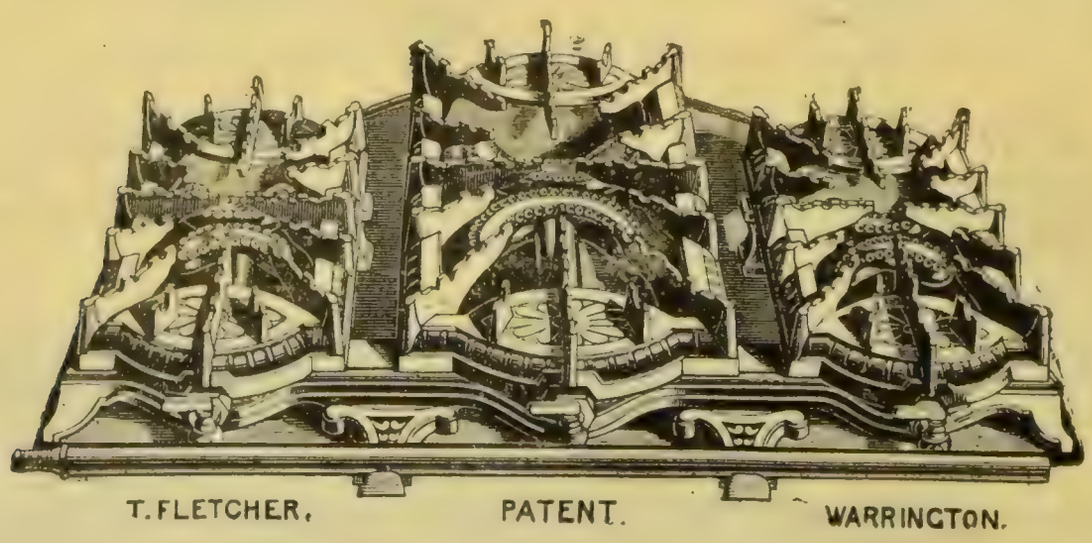
Price 9/6.

TWO BURNER HOT PLATES.

To boil 1, 2, 3, or 4 pans at once.

No. 24 with 2 No. 12 twin burners, **Price 22/-.** Size over all 17½ by 16in.

No. 36 „ 2 No. 18 „ „ „ **27/6.** „ „ 21 by 19in.



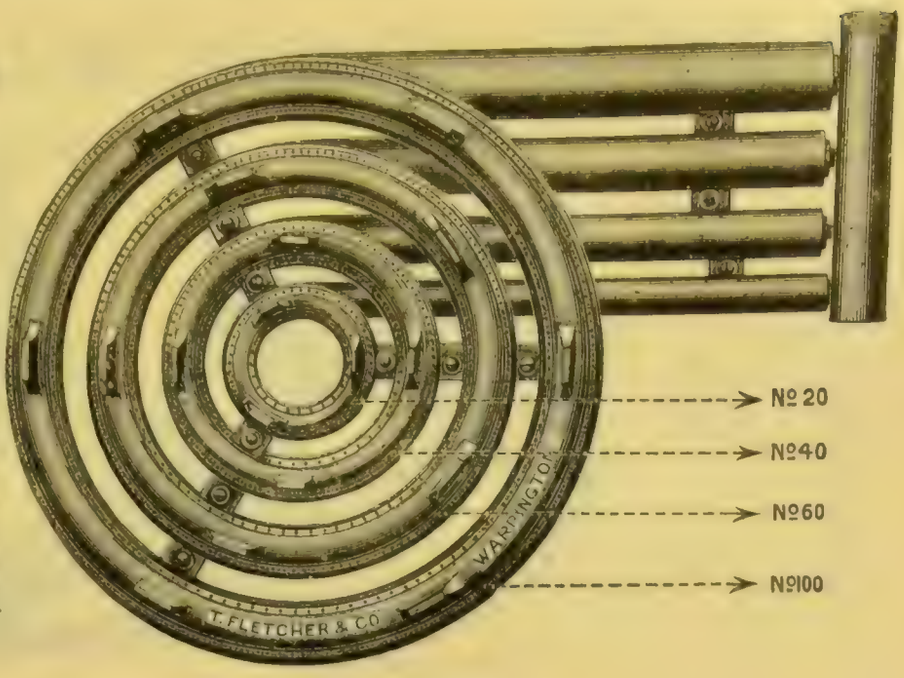
THREE BURNER HOT PLATE, No. 42.

With two small and one large patent twin burners, to boil 1, 2, 3, 4, 5, or 6 pans at once. Size over all 28in. wide, 20in. back to front. **Price 35/-.**

STANDARD HIGH POWER CONCENTRIC RING BURNERS.

For Large Vessels.

This series of burners is specially designed for use where the ordinary high power burners become unsatisfactory from the presence of dust or dirt, which is liable to choke the gauze. They are separate and independent of each other, four distinct burners, and can be purchased and used separately for any required purpose, or can be fastened together and supplied with separate taps to order. They are specially designed for use under vessels of large diameter.



No.	Length from Centre of Flame to end of Tube.	Diameter of hole the ring will pass through.	Gas Consumption per hour.	Quarts of Water boiled per hour (approximate.)	Gas Supply Pipe required.	PRICE.	PRICE with Tap.
20	18in.	6in.	20ft.	20	½in.	10/6	12/6
40	18½in.	10in.	40ft.	40	⅝in.	17/6	19/6
60	19in.	15½in.	60ft.	60	¾in.	25/-	28/6
100	20in.	21in.	100ft.	100	1in.	38/-	41/6
The above four combined as engraved	...	21in.	220ft.	220	1½in.	£5 4/-	£5 17s.

If coupled together 3/9 per Burner extra.



No. 15 STANDARD STAR BURNER.

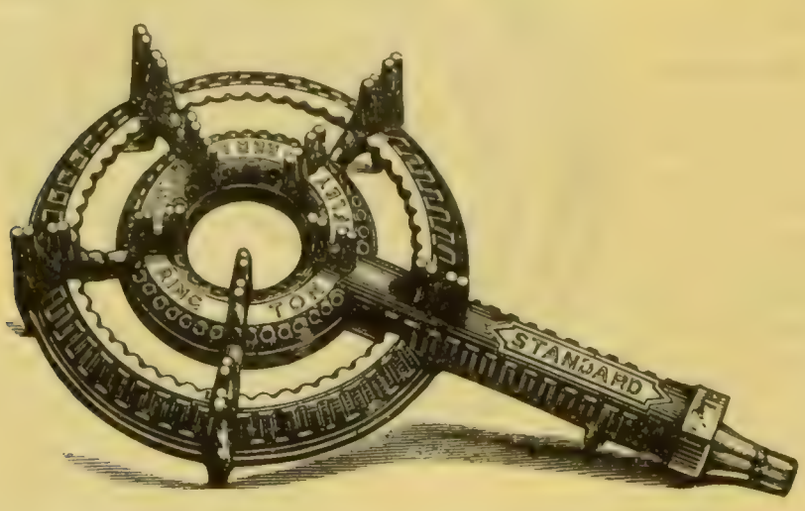
STANDARD STAR BURNERS.

These are a continuation of the well-known series of Standard Burners, and which are perfect in every detail. They overcome the objection to all ordinary Star Burners in the fact that both sides of the flames are ventilated, doing away with the strong tendency which most star burners have of making their presence disagreeably evident by the smell. The same rules apply with these new patterns as with the Standard; the number gives approximately the gas consumption per hour, the number of quarts boiled per hour in a light broad-bottomed copper vessel, and also the number of gallons of tea, &c., which can be kept at boiling point if previously boiled by a larger burner.

Number.	Height over all.	Diameter of Ring.	Price screwed for connection downwards.	Price with horizontal gas inlet and nipple for rubber tube.	Porcelain Enamelled Price EXTRA
	Inches.	Inches.	s. d.	s. d.	s. d.
5	4	1¾	2 0	2 6	0 5
10	4½	3½	2 9	3 0	0 10
15	5¼	4	3 0	3 3	1 3
20	5¾	5¾	3 9	4 3	2 0

F. R. & CO.'S STANDARD BOILING BURNERS.

NEW SERIES. REGISTERED.



These Burners are designed as a complete series of the highest and most perfect class, in the simplest possible form, and in one single casting. The support for vessels is broad, strong, and steady, carrying all vessels, from the smallest to the largest. The burners are perfect in every detail of form and construction, and they are offered as examples of the best burners which it is possible to construct for ordinary boiling and domestic use.

The numbers give approximately the maximum gas consumption at day pressure of gas equal to $\frac{10}{10}$, and also the number of quarts of water boiled in one hour in a light, broad-bottomed copper vessel.

		Price.	Porcelain Enamelled Price.	Diameter across support for vessels.
No. 10	Standard	... **1s. 10d.**	... **2 9**	... $5\frac{1}{2}$in.
„ **15**	„	... **2s. 6d.**	... **3 9**	... 7 „
„ **20**	„	... **3s. 9d.**	... **5 7**	... 8 „
„ **30**	„	... **10s. 6d.**	...**13 6**	... 10 „

No. 30 is two concentric burners with two separate taps. The price includes taps complete for this size.

PATENT * RADIAL * AND DUPLEX BURNERS.

TRADE MARK

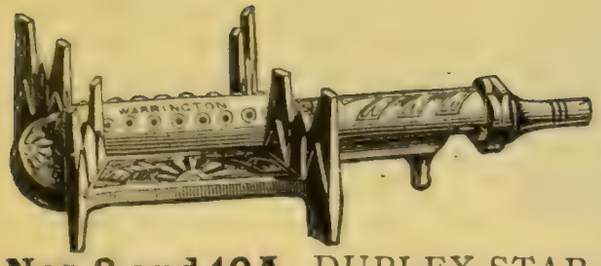
The series of Duplex Burners completes an entire range of Boiling Burners for all purposes. They are based, in constructive details, as closely as possible in accordance with the laws specified in my communication to the Gas Institute, and every care is taken that these burners shall, in every respect, be of the highest class. All sizes are made, both with the Patent Radial (slit) and also Star Flames, the price of both systems being the same for the same size. Like all our burners, the smaller sizes are CAST IN ONE PIECE, as are all the sizes, so far as the burner is concerned, doing away with the clumsy and doubtful joints which are ordinarily used, and which are so fruitful a source of leakage and annoyance.



Nos. 10, 12, & 16. DUPLEX STAR.

THE NUMBER GIVES THE TOTAL GAS CONSUMPTION AT FULL POWER AT ORDINARY DAY PRESSUPE (=$\frac{1}{10}$) OF GAS. *The number of the hot plates and combined burners gives the total maximum gas consumption of all the burners in the apparatus added together. This number, divided by 3 or 4, depending on the quality of the gas, gives the number of gallons per hour the burner will boil in a light copper vessel.*

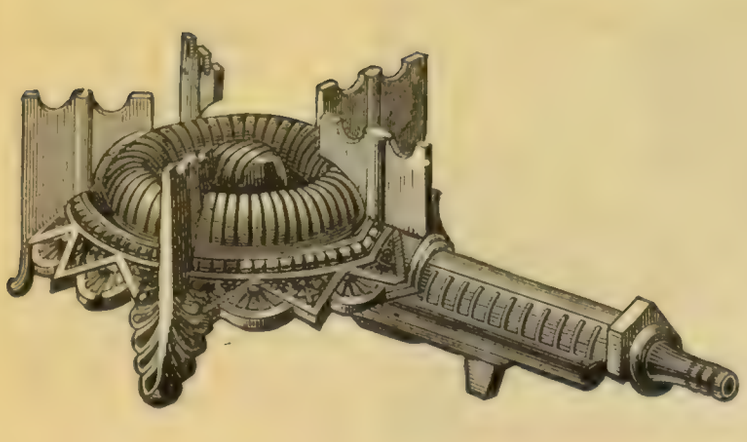
The support for vessels is unusually broad and steady, whilst it exposes the smallest possible quantity of metal to the action of the flame, thereby preventing waste of heat.



Nos. 8 and 10A. DUPLEX STAR.

PRICES:

No.		Width of support for vessels.	Height.	Price.	Porcelain Enamelled, Price.
7	Radial	5¼in.	2½in.	**1/9**	
8	Star	5¼in.	2½in.	**1/9**	**2/7**
9a	Radial	6½in.	3¼in.	**2/3**	
10a	Star	6½in.	3¼in.	**2/3**	**3/2**
9	Radial	6¾in.	3½in.	**3/-**	
10	Star	6¾in.	3½in.	**3/-**	
11	Radial	7¾in.	4in.	**4/-**	
12	Star	7¾in.	4in.	**4/-**	**6/3**
15	Radial	10 in.	3½in.	**5/-**	
16	Star	10 in.	3½in.	**5/-**	**9/-**
23	Radial	10¾in.	3½in.	**14/6**	
		2 concentric rings, with taps to each.			
26	Star	10¾in.	3½in.	**14/6**	**20/-**
		2 concentric rings, with taps to each.			



PATENT RADIAL BURNERS.

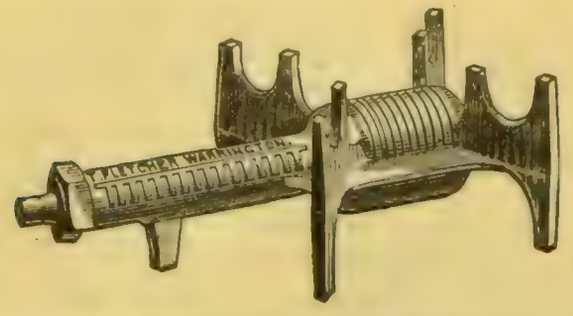
SMALL SIZE.

S R, Maximum consumption 12ft. per hour, **4s. 6d.**

LARGE SIZE.

L R, Maximum consumption 20ft. per hour, **6s. 6d.**

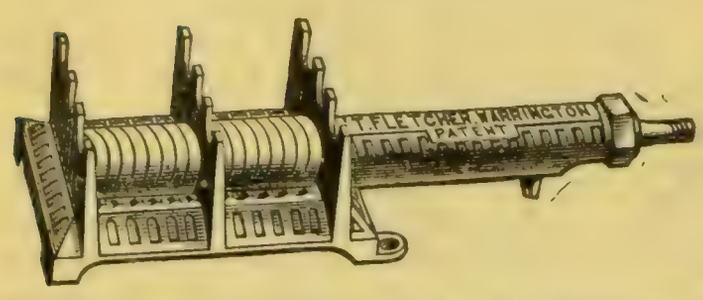
This pattern is also supplied without stand. Prices **3s.** and **4s.**



No. 8 R., Price 2s.

Porcelain Enamelled, **2s. 10d.**

This is in one casting, practically indestructible, and will boil water in a light kettle at the rate of over 2 quarts in 12 minutes. Consumption 12ft. per hour at full power.



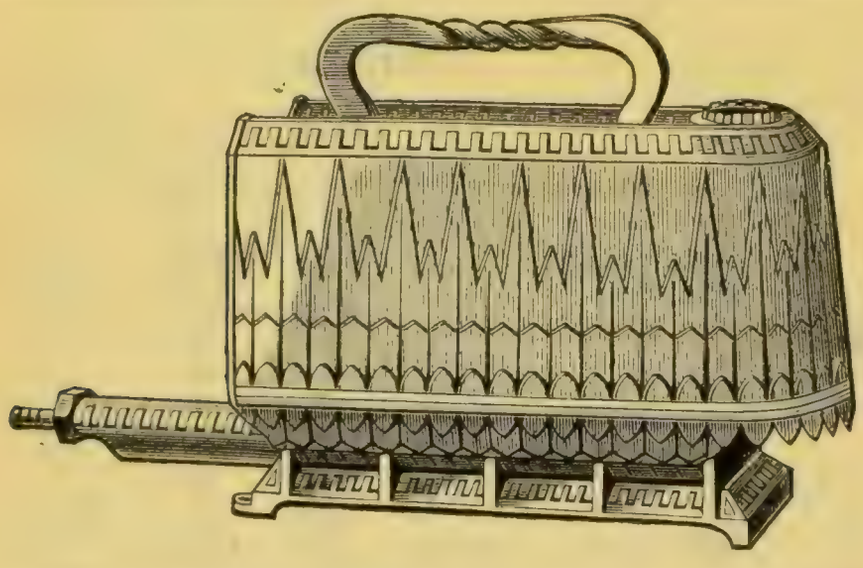
No. 10 S., Price 2s.

Porcelain Enamelled, **3s.**

Maximum consumption at $\frac{10}{10}$ pressure, 13 cubic ft. per hour. For soldering irons, boiling, smoothing and hatters' irons, and general workshop use.

Polished plate for Hatters' Velouring Cloths 1s. 6d. extra. The same burners in sets of 2 or 3, on cast iron stand, with tap to each burner, **5s.** per burner.

RADIAL OR DRILLED AS ORDERED. TOTAL LENGTH 12 INCHES.

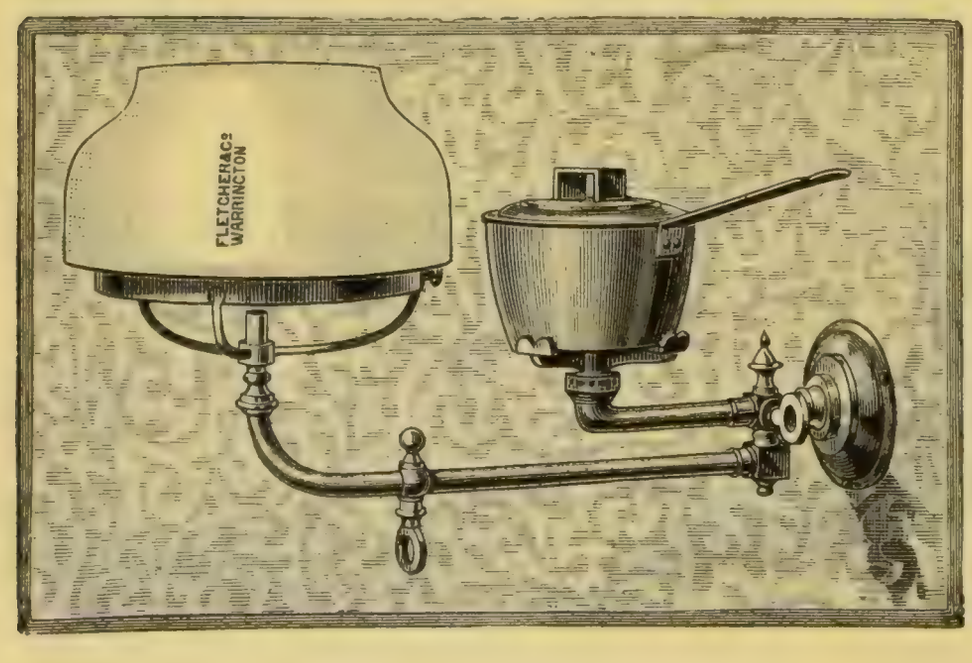


13 S., Price 4s. 3d.

This is the same burner as 10 S., fitted with cover for **Hatters' Irons.**

This is similar to 15 S., but a smaller size, to fit ordinary hatters' irons. Polished plates, to fit the same burner, for heating Velouring Cloths, 1s. 6d. each.

The same burners in sets of 2 or 3, on cast-iron stand, with tap to each burner, **8s. 6d.** per burner.



COMBINED BRACKET FOR LIGHT & BOILING PURPOSES

FOR NURSERIES, BEDROOMS, SURGERIES, &C.

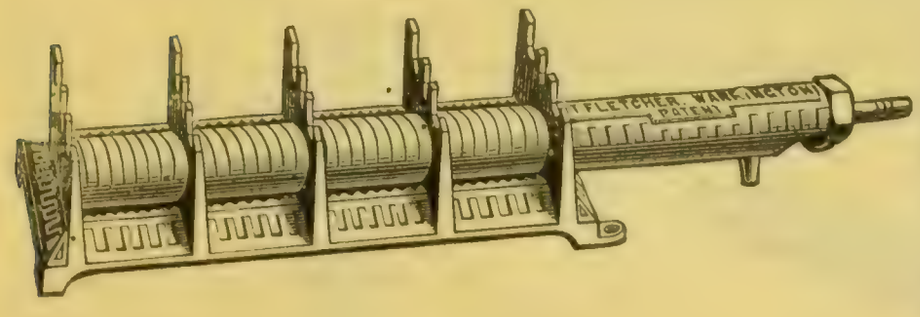
Price—

Polished Brass or Steel Bronze, **17s.**

Globes and Holders and Pans extra to order.

Special Patterns in any style of decorative brass work, for dentists' operating rooms, &c., to order. The boiling burner is a fixture, the light will swivel round on either side.

HEATERS FOR TAILORS' IRONS.

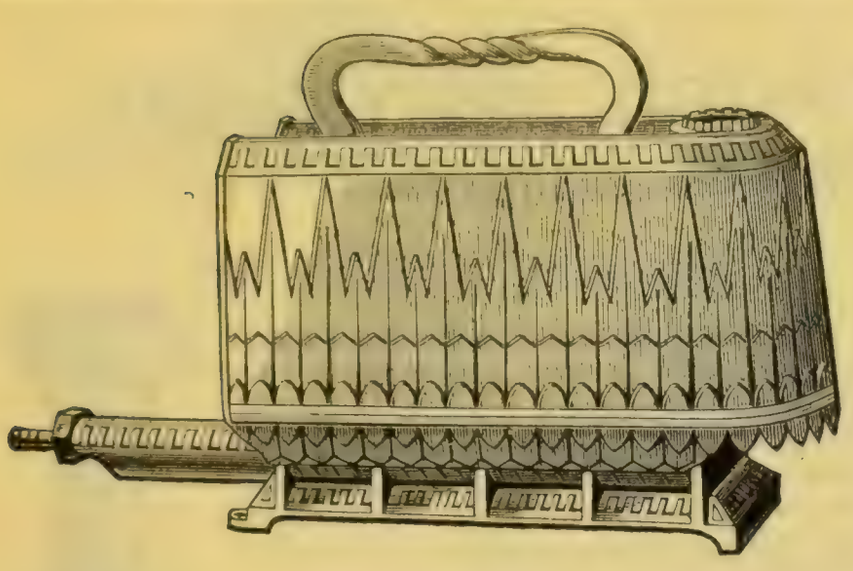


14 S., Price 3s. 6d.
Porcelain Enamelled,
5s.

A similar burner to 10 S., but longer and more powerful. Specially designed for Tailors' Irons. Total length, 16½ in.

The same burners in sets of 2 or 3, on cast-iron stand, with tap to each burner, **8s.** per burner.

RADIAL OR DRILLED, AS ORDERED.



15 S., Price 9s. 6d. The same burner as 14 S. above, with cover to economise heat.

This will take a 28lb. tailor's iron, and heat it fully in 15 minutes.

The same burners in sets of 2 or 3, on cast-iron stand, with tap to each burner, **13s.** per burner.

FLEXIBLE GAS TIGHT TUBE.

We are now able to supply a high-class flexible Tube, which after extended tests has proved in our hands to be perfectly gas tight and free from smell. It is covered with neat braiding, and is well finished, each length being supplied with elastic ends fitted. Any lengths supplied to order at the same price per foot. No screw unions or brass ends are required.

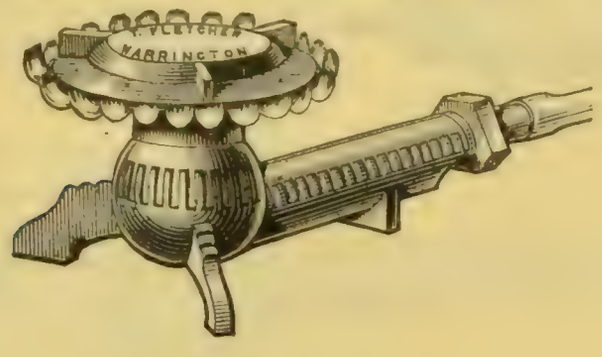
PRICE.

½-inch bore ... ... **1s. 3d.** ... ... **per foot.**

Including elastic ends fitted to each length.

DRIP-PROOF STAR BURNER.

This is specially designed for wet, dirty work, such as glue pots, book-binders' tools, liquids liable to boil over, and places liable to drip. It will burn perfectly under a steady drip of water, and is not interfered with by falling dirt. Will burn steadily with any gas supply from 2 to 14 feet per hour at $\frac{10}{10}$ pressure.



The burner will pass through an opening 3 in. high by $4\frac{1}{2}$ in. wide. **Price 3s. 6d.**

F. R. & CO.'S PATENT SAFETY BUNSEN.

IMPROVED PATTERN.



These will be found as perfect as any upright tube burner can possibly be made, of the highest possible power for the size, can be turned down to the merest flicker without lighting back, and can be mounted on tubes in any form or number when very high powers are required. They are made in three sizes, all in brass, polished. The number gives the maximum gas consumption in cubic feet per hour at $\frac{10}{10}$ pressure. These burners can be supplied in clusters of any number, or mounted on tubes, any shape, and with or without taps, to order.

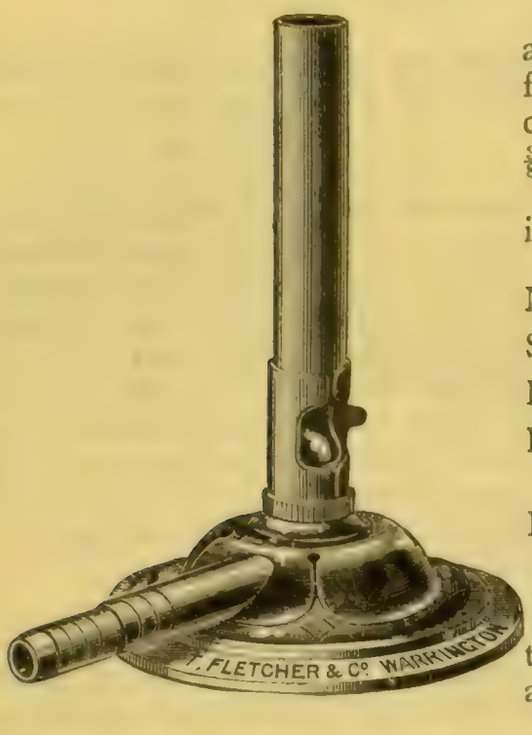


Number	5	10	14
Diameter across top of gauze...	$\frac{7}{8}$in.	$1\frac{1}{4}$in.	$1\frac{1}{2}$in.
Height without stand ...	...$3\frac{3}{4}$in.	$4\frac{3}{4}$in.	6in.
Price, without stand ...	...**1/9**	**2/3**	**3/-**
Price, on brass stand ...	...**3/6**	**4/6**	**5/9**

If placed a number together, on a tube or ring, they must be at least one-fourth the diameter of the top apart. The stand increases the total height about one inch.

SETS—**No 10 size.** Each burning 10 cubic feet of gas per hour. Mounted in clusters of four burners (40 ft. per hour), 13/-; seven burners (70 ft. per hour), 20/-; twelve burners (120 ft. per hour), 33/6. Total height, 6 inches.

F. R. & CO.'S BUNSEN.



These are the ordinary brass tube Bunsen. They are correctly proportioned in every detail, and of the full theoretical power, working up to their maximum calculated duty in every case. All are screwed for $\frac{3}{8}$ connection.

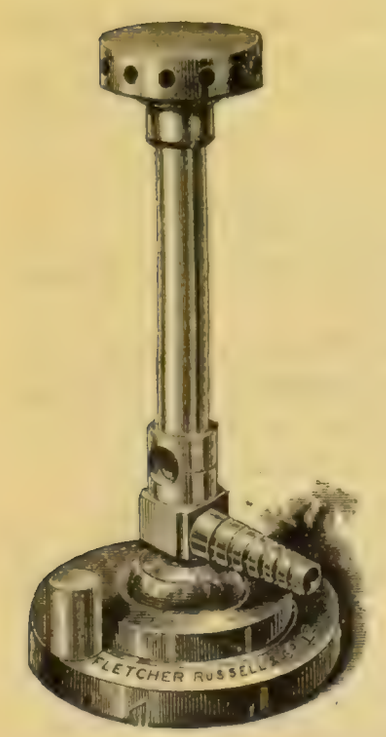
The number gives the maximum gas consumption in cubic feet per hour at $\frac{10}{10}$ pressure.

Number	3	5	6	8	12
Size of tube outside ...	$\frac{3}{8}$in.	$\frac{7}{16}$in.	$\frac{1}{2}$in.	$\frac{5}{8}$in.	$\frac{3}{4}$in.
Height without stand...	$3\frac{1}{2}$in.	$4\frac{1}{4}$in.	5in.	6in.	7in.
Price each without stand	**7d.**	**9d.**	**10d.**	**1/-**	**1/6**
Price on brass stand ...	**2/-**	**2/2**	**2/4**	**3/-**	**4/-**

If fitted with tap, 1s. extra.

All have air slides; these enable the smaller sizes to be used with a blow pipe without the necessity of a loose internal tube.

Heavy round brass stands ONLY are supplied. The objectionable nature of iron stands on a laboratory table is too well known to need any remark. The stand increases the total height about 1 inch. They can be supplied in clusters of 3, 4, 7, or 12 burners, or mounted on tubes, in any form.



NEW LABORATORY BUNSEN.

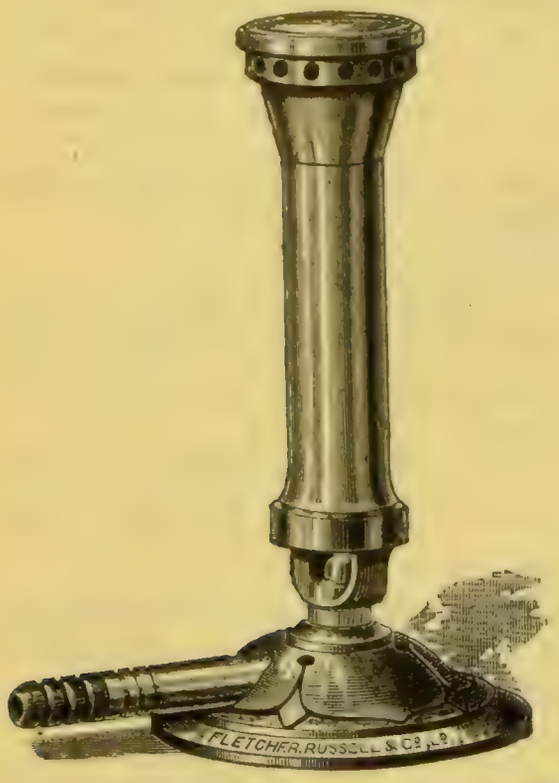
We have frequently been asked to make a correctly adjusted Bunsen for laboratory use, but have declined, owing to the very low prices at which the common foreign burners are made. As we have, however, established a private demand for these burners, we have decided to put them on our list for the future. The burners are substantially made, correctly adjusted, the screws are English standard threads, and the stand is formed with a carrier to hold the rose when not in use, so as to prevent its loss, which usually happens with the ordinary make. The roses are solid cored castings, not made out of thin parts stuck together, as is usual in the cheaper makes.

Height, with rose as engraved, $5\frac{1}{2}$ in. Gas consumption at $\frac{1}{10}$, 4 ft. per hour.

Price, Bunsen without rose, **1s. 9d.**
Rose extra, **9d.**

NEW STANDARD ROSE BUNSEN.

DRIP-PROOF, RUSTLESS, AND THE MOST POWERFUL BURNERS EVER DESIGNED IN PROPORTION TO THEIR SIZE.



These Burners are specially designed for wet, dirty work, and are proof against drip, wet, and dust.

Like all the series of the Standard Burners, they are in every detail correctly proportioned, giving the highest duty with the simplest, cheapest, and most perfect form, and for their special work—where dirt, boiling over, and drip cannot be avoided—they leave nothing to be desired. The flame holes are protected by a rim, and slope downwards to prevent wet running into the burner, the gas jet is protected from any falling dirt, and for their size they are the most powerful burners ever made.

The number gives the gas consumption per hour, and approximately the quarts of water boiled per hour in a light broad-bottomed copper vessel :—

	Height.	Diameter.	Diameter of Flame.	Price without Stand.	Price with Brass Stand.	Price with Stand and Tap.
No. 5 ...	5 in.	1 in.	2½ in.	**1/9**	**4/-**	**4/9**
,, 10 ...	6 in.	1½ in.	3 in.	**2/3**	**4/6**	**5/3**
,, 15 ...	7 in.	1¾ in.	4 in.	**3/-**	**5/9**	**6/6**

The correct distance between the top of the burner and the bottom of the vessel to obtain the best duty is ½ in.

These Burners are made of fine brass, and can be adjusted to any special quality of gas to order without extra charge.

Clusters of any number of burners for any special work can be supplied of any required power.

F. R. & CO.'S ARGAND BUNSEN.

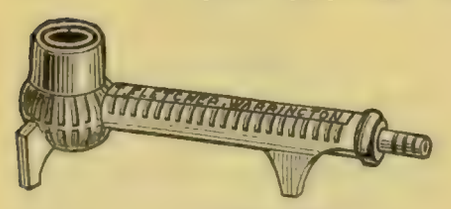


FIG. 200.

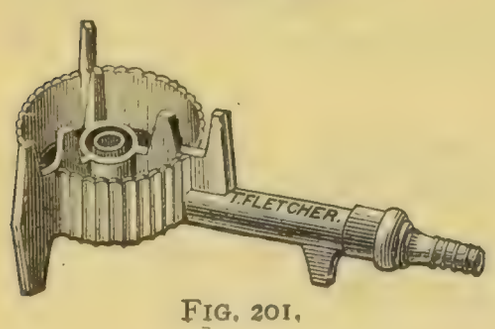


FIG. 201.

A cheap, simple, and indestructible Burner for small laboratory work.

The flame of these Burners is shorter, more compact, and higher in temperature than an ordinary Bunsen, and is also free from smell.

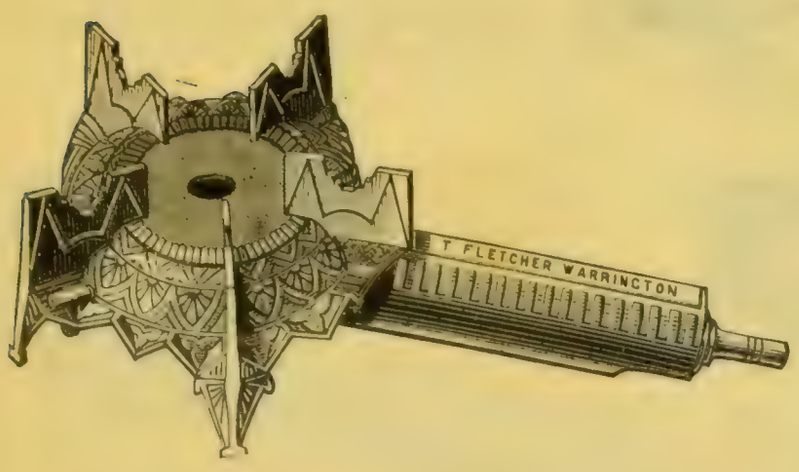
The air supply is self-adjusting.

The sizes given are the bore of the horizontal tube.

Gas consumption.	Price with tripod: Fig. 201	Price without tripod. Fig. 200
½in. size...3½ft. per hour	**3s.**	**2s. 3d.**
¾in. ,, ...7 ,, ,,	**3s. 9d.**	**2s. 9d.**

All the above work perfectly with Air Gas or Coal Gas, but if the gas is rich, the tip of the brass gas jet may want knocking in a shade smaller. If made too small, the burner lights back.

F. R. & Co.'s Special High Power Burners.



On an average it may be taken that three to four cubic feet of gas will boil one gallon of water in an ordinary vessel. The gas consumption of each size is given, and the power can, therefore, be readily calculated.

These Burners are the highest power for their size which it is possible to make.

The laws ruling the construction of heating burners, as given in my communication to the Gas Institute, and published in the Transactions for 1883, have been strictly adhered to in these burners, which, for their size, are unapproached in power by any burners in existence.

The 4in. Burner, which is the one shown in the engraving above, will, with ordinary day pressure of gas, boil one gallon of water in a flat copper vessel in seven minutes, or ten to thirteen gallons per hour.

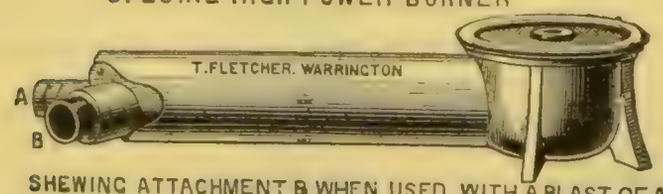
PRICES.

Size across the Gauze Surface.	Gas Consumption in Cubic Feet.	Price with Iron Gauze.	Price with Pure Nickel Gauze.	Gas Pipe required.
2¾in. diameter.	25ft. per hour.	**6/-**	**8/-**	⅜ clear bore.
4in. ,,	40ft. ,,	**8/-**	**11/-**	½in. ,,
6in. ,,	90ft. to 100ft. ,,	**12/6**	**17/-**	¾in. ,,
8in. ,,	200ft. to 250ft. ,,	**26/-**	**34/-**	1in. or 1¼in.



The 6 in. and 8 in. sizes have no tripod or support for vessels, as the Burners are too small to carry the vessels they will heat. (See engraving.) The distance between the burner and bottom of vessel should be about the same as the diameter of the gauze of the burner used.

SPECIAL HIGH POWER BURNER



SHEWING ATTACHMENT B WHEN USED WITH A BLAST OF AIR

An extra pattern of these burners is also made in all sizes to work with or without a blast of air. For working with ordinary gas pressure the gas must be connected to the jet A facing the centre of the tube. When a blast of air is used the air must be connected to this jet and the gas to the side nozzle.

All the following are without tripod.

Size of burner across gauze surface.	Gas consumption without blast at full power.	Gas main required without blast.	Gas consumption with blast at full power.	Gas main required with blast.	Price without blast arrangement.	Price of combined form to be used with or without blast.	If with pure nickel gauze extra.
in.	ft. per hour.	in.	ft. per hour.	in.	s. d.	s. d.	s. d.
2¾	25 ...	¾	180 ...	1	4 0	6 0	2 0
4	40 ...	1	280 ...	1½	6 3	9 0	3 0
6	90 ...	1¼	650 ...	2	12 6	20 0	4 6
8	200 ...	1 to 1½	1,400 ...	3	26 0	34 0	8 0

By enlarging the air jet the power may be increased very considerably, but in this case the burners cannot be used with the ordinary pressure of gas without a blast. The 6-inch high power burner will melt 1 cwt. of lead in 50 minutes without a blast, or with a blast of air the 4-inch burner will melt 1 cwt. in about 15 minutes.

INDESTRUCTIBLE GAUZE.

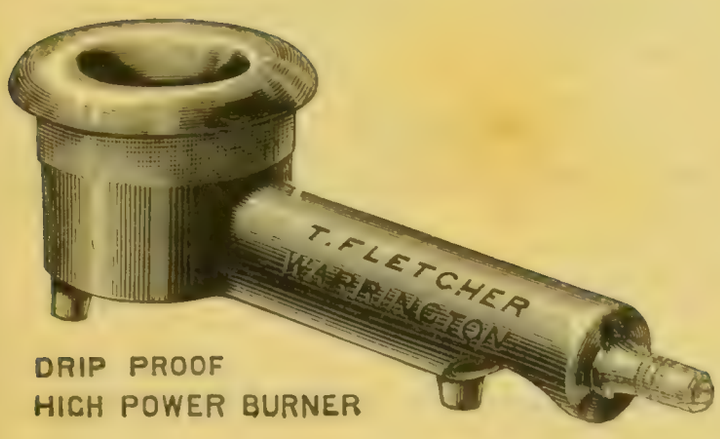
FOR HIGH POWER AND OTHER BURNERS.

We are now able again to supply Pure Metallic Nickel Gauze, practically infusible and indestructible, at the following charges :—

	Each Gauze.		Each Gauze.
No. 5 Safety Bunsen	3d.	No. 4 High Power	3/-
„ 10 „ „	4d.	„ 6 „ „	4/6
„ 14 „ „	5d.	„ 8 „ „	8/-
„ 3 High Power	2/-	Low Temperature Burner	3/-

These will be found in every respect equal to pure Platinum Gauzes, at about one-tenth the cost. One Gauze will last on any burner for years in continual daily hard use, in the dirtiest work.

DRIP PROOF HIGH POWER BURNERS.



DRIP PROOF
HIGH POWER BURNER

No. 25, burning 25 cubic feet of gas per hour. This requires a ½ in. clear bore gas supply pipe. **Price 6s.,** or with pure Nickel Gauze, **6s. 3d.**

No. 40, burning 40 cubic feet per hour. Requires a ⅜in. bore gas pipe. **Price 10s.,** or with pure Nickel Gauze, **11s.**

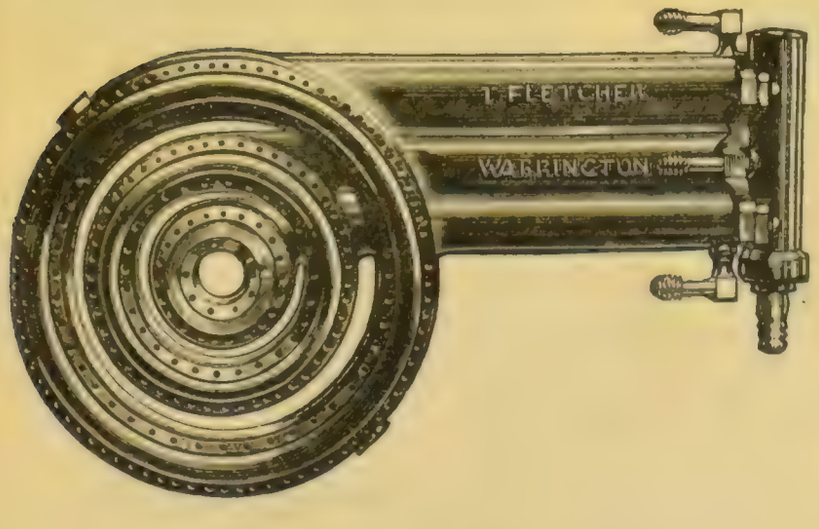
No. 60, burning 60 cubic feet per hour. Requires a ¾in. bore gas supply. **Price 16s. 6d.,** or with pure Nickel Gauze, **18s.**

No. 90, burning 90 cubic feet per hour. Requires a ¾in. bore gas pipe. **Price 19s.,** or with pure Nickel Gauze, **21s.**

No. 200, burns 200 cubic feet per hour. Requires a 1-inch clear bore gas supply. **Price 33s. 6d.,** or with pure Nickel Gauze, **37s. 6d.**

These burners are generally used under vessels either fixed or supported on wrought-iron stands. The burners themselves are very small in proportion to the power and the size of vessel they will heat. The bottom of the vessel should be about 1½ inches clear above the top of the burner.

TRIPLE CONCENTRIC BURNERS.

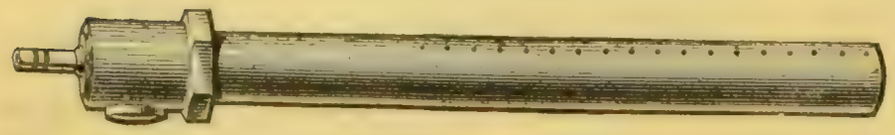


This is 8½ in. extreme diameter, and the three burners are in one single substantial casting. It has been designed as the most powerful concentric ring burner which it is possible to produce, giving, at command, exact powers and exact sizes of flames.

Gas consumption at $\frac{10}{10}$ pressure—

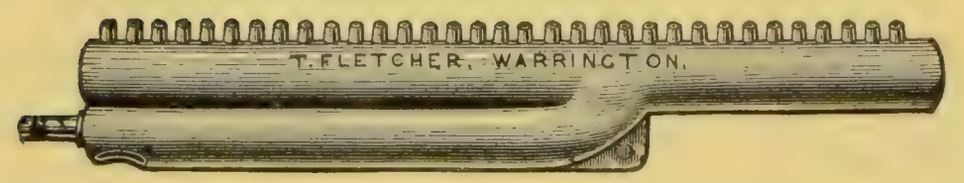
Centre ring, 9 cub. ft. per hour.
Middle „ 20 „ „
Outer „ 24 „ „
The 3 combined, 53 cub. ft. per hour.

Price, as engraved, **30s.,** or with separate tripod Stand, **6s.** extra.



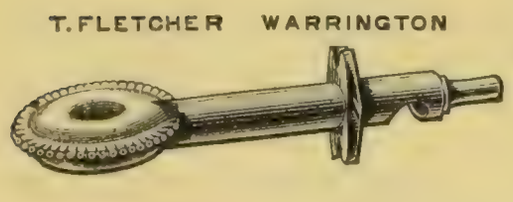
Wrought iron tube burners, straight or curved, any length and any power, without limit, with or without blast. If necessary, tube burners can be made with a perfectly equal and uniform flame, 15 feet long, or upwards.

For all special burners the maximum power, the exact work to be done, or the gas consumption must be specified. The maximum power is quite independent of the length of flame.



B 24.—Pattern with separate jets.

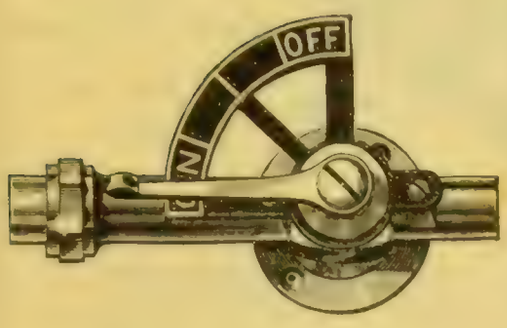
This is made in numerous lengths, both with mixing tube as shown, and also at right angles. These burners are cast iron, and much more durable in use than wrought iron. The prices depend on the power rather than length of flame.



Horizontal Star, with central air way. This is in every respect the best star burner known. The faults peculiar to this class of burner are all completely remedied by the use of a horizontal tube. Diameter of star 3¼ inches. Total length 9 inches. **Price 2s.**

Longer pattern, total length 11½ inches. Same power. **Price 2s. 3d.** This size is also made with flat lugs. Either of these will burn steadily with 1½ to 10 feet per hour, giving a perfectly clear flame with any pressure of gas.

SPECIAL TAPS FOR GAS HEATING APPLIANCES.

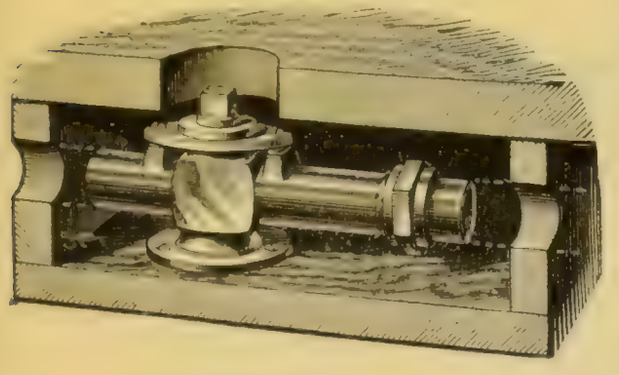


These taps have a full bore in the plug and barrel, are thoroughly well made and finished, and in case of repairs or cleaning can be taken apart from the front or upper side, so that they may be fixed in recesses or wall boxes without risk. Anything which can possibly happen to a tap can be made good without disturbing any joint, a matter of great importance when fixed in plaster or brick walls or under floors. The taps are of the finest workmanship throughout. All are made with screw union.

QUADRANT TAPS WITH LEVER AND GRADUATED ARM.
BRASS GAS THREAD.

Size	...	⅜in.	...	½in.	...	⅝in.	...	¾in.	...	1in.
Price		**3 6**	...	**4 6**	...	**7/-**	...	**8/-**	...	**10/6**

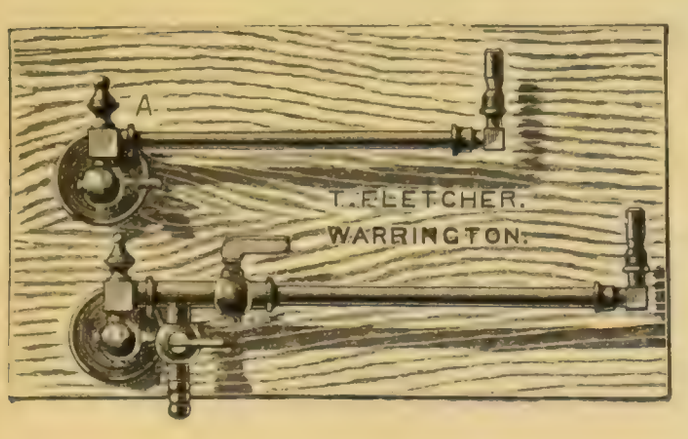
Cast **Floor Plates** can now be supplied to cover the recesses when taps are sunk in the floor. **Prices**:—4½in. square over all, **2/-**, suitable for any size up to ⅝in.; 6½in. square over all, **2/4**, for larger sizes.



TAPS WITH KEY FOR SETTING IN RECESSES OR UNDER FLOORS.

(AS ENGRAVED).

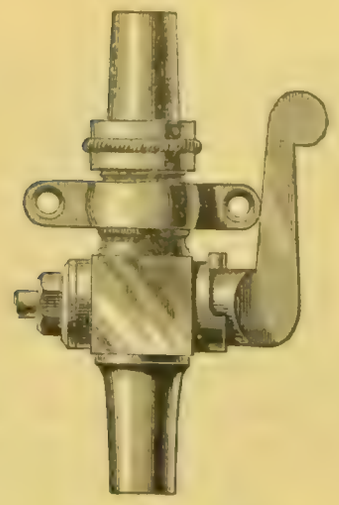
Sizes and prices same as above. These patterns are supplied with brass key complete.



GAS SUPPLY TAPS, SUITABLE FOR RUBBER TUBE, SCREWED JOINTS OR SOLDERING.

Fig. 113, to obtain a supply from an ordinary bracket. The engraving shows a bracket with and without the attachment.

Price of the attachment only; ⅜in. size, **3/6**; ½in. **4/-**.



Main Supply Tap, as engraved.

For ½ inch pipe, **4s.**
For ¾ ,, **6s.**

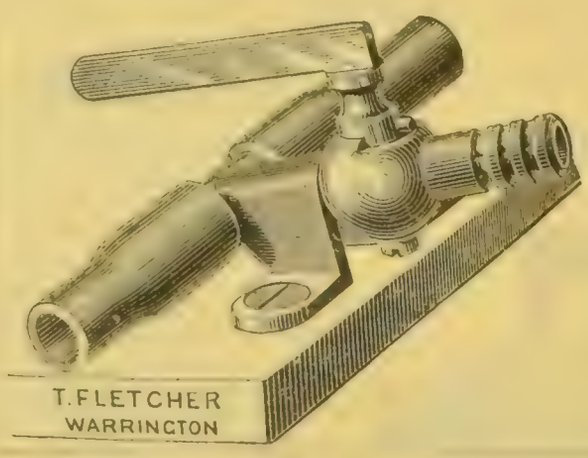


Fig. 112.
To obtain a side supply from the middle of a pipe.

⅜in. size only
2/-.

Screw.	Bore.	Price.
⅜in. brass gas	¼in.	**1/-**
¼in. iron ,,	⅜in.	**1/4**
⅝in. brass ,,	½in.	**2/-**
½in. iron ,,	½in.	**2/4**

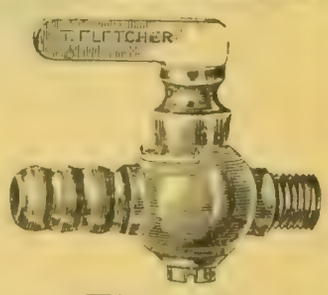
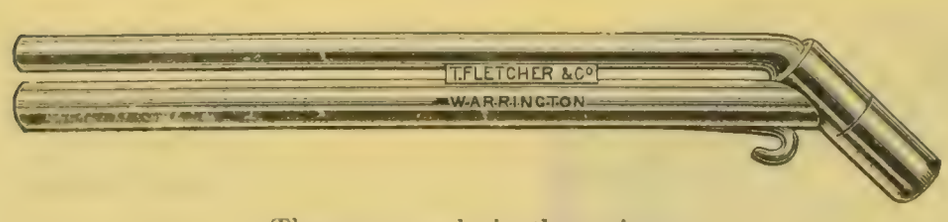


Fig. 114.

F. R. & CO.'S OXYGEN BLOWPIPE.

FOR USE WITH BRIN'S COMPRESSED OXYGEN.



These are made in three sizes.

No. 7 requires about 7 cubic feet of oxygen per hour, and ¼in. gas supply, and will fuse a ¼in. wrought-iron rod easily. **Price 8/6.** With Taps for use with Governor, to order.

No. 10 requires about 20 cubic feet of oxygen per hour, and ⅜in gas supply, will fuse ½in. wrought-iron rod, and will rapidly braze copper boilers and pipes ⅛in. thick. **Price 10/-** With Taps for use with Governor, to order.

No. 40 requires about 40 cubic feet of oxygen per hour, and ½in. gas supply pipe, will fuse a clean hole in one minute through a 4in. wrought-iron steam pipe ¼in. thick, and will braze work rapidly of considerably greater weight than this. **Price 12/-** With Taps for use with Governor, to order.

The compressed oxygen may be obtained from the Brin Oxygen Company.

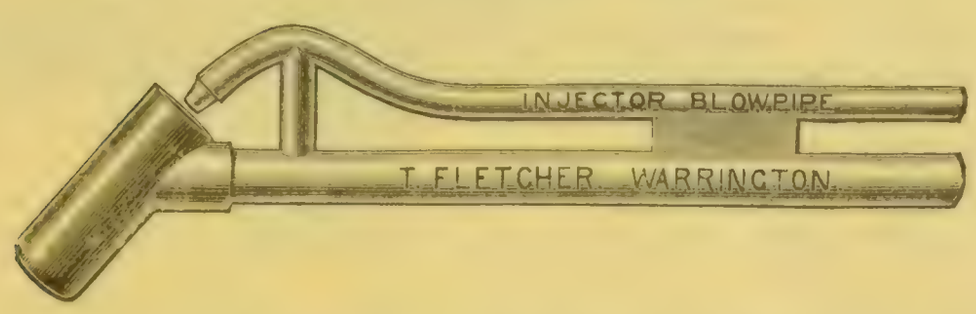
Repairs of Machinery in difficult positions can be done with a small bottle of oxygen and these blowpipes, with a small supply of ordinary coal gas, with the greatest ease.

NOTE.—These blowpipes are totally useless for coal gas and air; they are specially designed for use with compressed oxygen *only*.

Rules for the selection of apparatus for special purposes, and hints as to management will be found in "Coal Gas as a Fuel," by Thos. Fletcher, F.C.S., **Price 1s.,** post free.

F. R. & CO.'S INJECTOR BLOWPIPE

FOR HEAVY BRAZING.



This is the most powerful blowpipe made which is light enough to use freely in the hand for difficult work of large size. The engraving shows the blowpipe one quarter full size, and at least a ¾in. clear bore gas pipe and tap are necessary to supply it at full power. With the smallest air jet and **No. 5** Blower it will braze large copper sheets or cylinders, 2½lbs. to square foot, rapidly and easily, and solid work of proportionate weight. With the largest air jet and small heavily weighted smith's bellows it will braze copper up to 2 lbs. square foot. Two blowpipes used on same work will braze nearly double the weight of metal. The workman's hands are well away from the heat in doing large surface work.

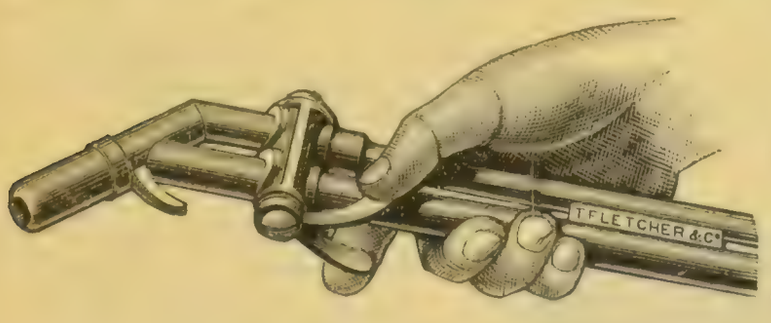
This is the only blowpipe made which can be used satisfactorily on large sheet work without the assistance of a coke fire. It is about double the power of the well-known pattern **8 C.**

Price, with two air jets, **12**/-

F. R. & CO.'S AUTOMATIC BLOWPIPE.

PATTERN C.

This will be found a simple and most extraordinarily efficient blowpipe for ordinary workshop use. Both gas and air are controlled with a movement of the finger, a few minutes' practice giving perfect mastery over the character of the flame.



C 10.—Small size, for fine light work, taking air jets not exceeding ⅛-in. bore. **Price 9s.** The same blowpipe on Stand, **12s. 6d.**
This requires Foot Blower No. 3 size.

C 40.—Medium size, for small workshop use, key brazing, copper gas pipe up to ¾-in., &c., taking air jets not exceeding ¼-in. bore. **Price 11s. 6d.** The same Blowpipe on Stand, **17s. 6d.**
This requires Foot Blower No. 5 size, and ½-in. clear bore gas supply pipe.

C 80.—Large size, Injector pattern, will braze ½-in. thick flange on 1½-in. wrought-iron pipe and copper cylinders up to 2 lbs square foot. **Price 18s.**

This requires at least ¾-in. clear bore gas supply, and Foot Blower No. 5 size.

The number gives approximately the gas consumption per hour at full power.

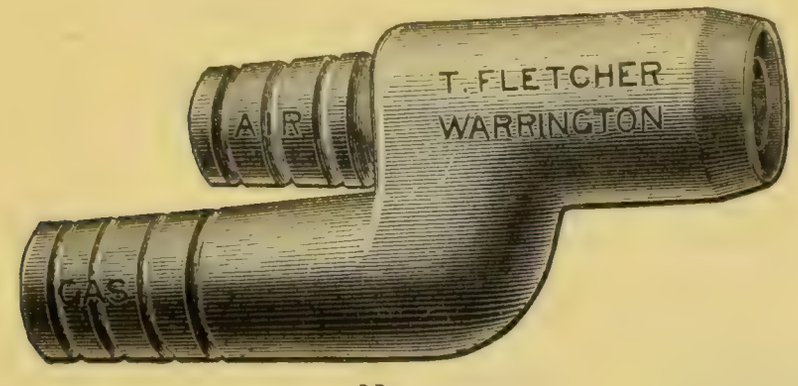
The Gas and Air Tubes of any pattern of Blowpipes, can be made any length required, to suit special trades, at a small additional cost.

The **PRESSURE OF THE AIR** supplied to any blowpipe rules the temperature of the flame and the power obtained. For a sharp *concentrated* heat a fan is quite useless and smith's bellows nearly so. To get the best work an air pressure of 1 to 1¼lbs. on the square inch is necessary. This can be obtained either with our ordinary foot blowers or with Root's Blower, driven by power, and except those patterns which are specially designed for fan or smith's bellows the powers specified refer to those obtained with our own foot blowers, which give an air supply at a pressure of 1¼lbs. square inch.

LARGE BLOWPIPES.

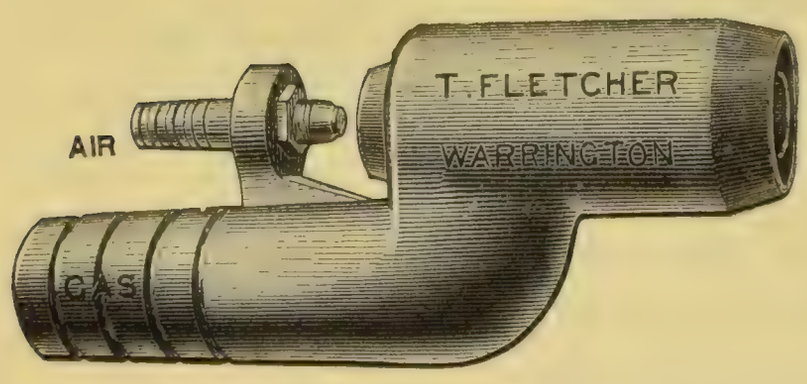
FOR BRAZING, REPAIRING MACHINERY, RETORT AND FURNACE HEATING, &c.

It has been found wasteful and unsatisfactory to use illuminating gas, whatever its quality, for large work, without a blast of air under pressure, owing to the difficulty and uncertainty of making a perfect mixture of air and gas—the usual result being a smoky and unsatisfactory flame of low temperature, giving a very low duty. The following Blowpipes have been made to remove this difficulty, and they will be found exceedingly useful for repairs of pipes and joints, without the necessity of stopping or pulling machines to pieces.



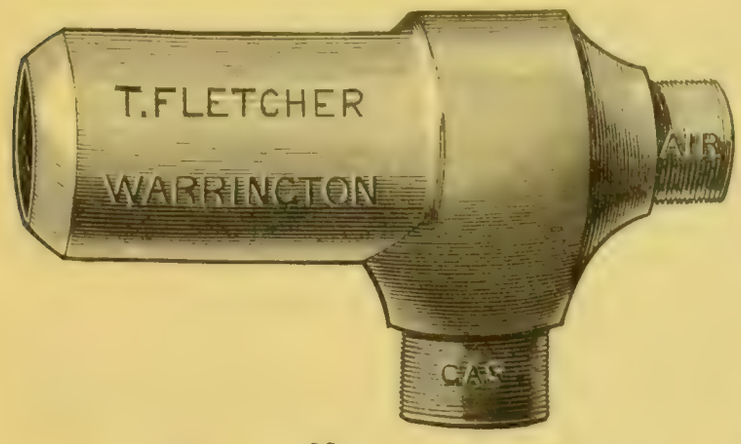
No. 1.

No. 1, **Price 6s.,** requires a smith's bellows or good fan and a 1½ inch gas main. It will burn up to 300 cubic feet per hour, and will heat a 3 inch wrought-iron pipe to brazing heat in 5 to 6 minutes. If used under a boiler in series they can be placed side by side at the upper part of the flue, and each burner will give steam for about 4 H. P. indicated in an ordinary boiler.



No. 2.

No 2, **Price 9s.,** is the same power as No. 1, but can be used with our own foot blower No. 5, enabling it to be taken and used in positions where an ordinary smith's bellows would be a matter of great difficulty. With this a flaw in a pipe can be brazed in any position where it can be seen.



No. 3.

No. 3, **Price 11s.,** specially adapted for retorts and furnaces, the gas and air pipes being screwed respectively to 2in. and 1½in. iron gas thread for permanent couplings. The air jet in this is about double the area of the previous patterns, and with a good fan it has double the power of No. 1.

Gas is in many places now a waste product, which is difficult to utilize, and these blowpipes have been designed to meet a growing necessity.

In reply to many enquiries, petroleum gas and producer gases, although satisfactory for furnaces, are very difficult to use in any open blowpipe for brazing and shop repairs.

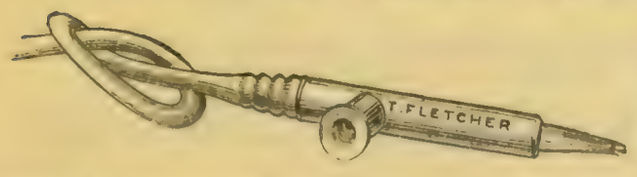


NEW PATTERNS OF **Fig. 8 C** BLOWPIPE, with improved control tap arrangement, gas and air supplies independent and under the control of one finger.

IMPROVED 8 C, SMALL SIZE. **Price 8s. 6d.**
,, 8 C, SMALL SIZE, without Taps. **Price 5s.**
For jets not exceeding ⅛th. bore.

IMPROVED 8 C, LARGE SIZE. **Price 10s. 6d.**
,, 8 C, LARGE SIZE, without Taps. **Price 7s.**
This requires ½in. gas supply, and will take jets up to ¼in. bore. This will braze up to 1in. wrought-iron pipe, if used with our foot blowers, No. 5 size.
The old pattern is not now supplied.

F. R. & CO.'S UNIVERSAL BLOWPIPE.

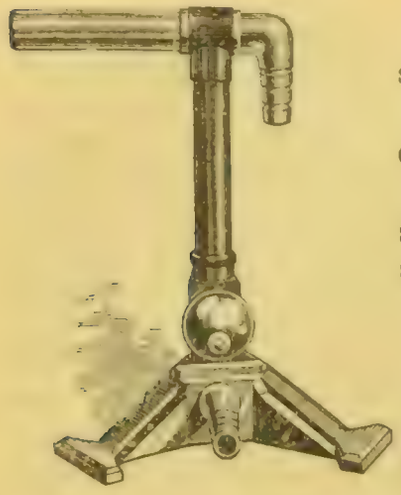


This, in its simplest form, consists of a "head" only, for screwing on a gas pipe, and can be used in any existing arrangement or bracket. The other forms shown are additions and attachments to this, for special purposes, but all are interchangeable. The jets are the same as those used on the Automatic, the smallest pattern taking any jet not exceeding ⅛in. bore; the largest from ⅛in. to ⅜in.

As will be seen, the same blowpipe not only takes a large range of jets, but admits of any and every adaptation which can possibly be required in any trade.

PRICES.
Universal Blowpipe "head" as engraved with straight or bent air inlet.
No. 3.—Price 4s. 6d. Small size to fit ⅜in. brass gas pipe.
No. 5.—Price 5s. 6d. Large ,, ¼in. ,, ,,
(Extra jets 3d. each.)

Sizes of Blowpipe Jets— 0 1 2 3 4 6 8



UNIVERSAL BLOWPIPE—*continued.* On stand with swivel joint, and with straight or bent air inlet as ordered.

No. 3.—Price 8s. 6d. Small size on stand (as engraved). The same, with tap for gas, **10s.**

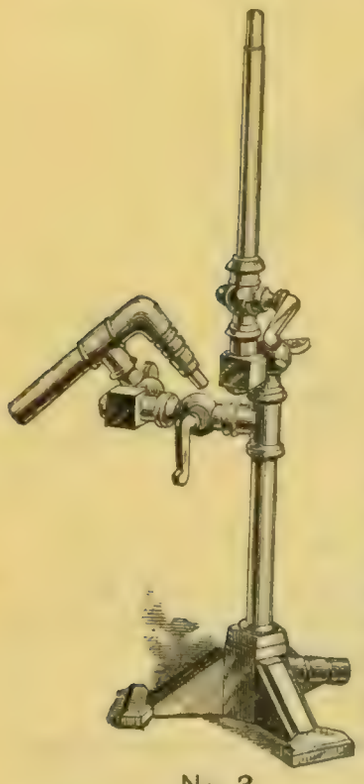
No. 5.—Price 12s. 6d. Large size (as engraved) on stand. This requires a $\frac{5}{8}$in. bore gas supply pipe. The same, with tap for gas, **15s.**

Gas supply required for full power—

Smallest size blowpipe $\frac{3}{8}$in. pipe.

Large size blowpipe requires $\frac{5}{8}$in. clear bore pipe and tap.

If used with our foot blowers, the smallest size requires No. 3 blower, the large size No. 5.



No. 3.

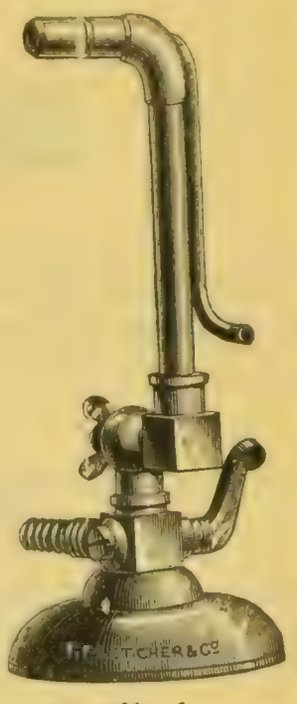
JEWELLERS' AND DENTISTS' PATTERNS.

No. 3, Price 16s. 6d., with bench light and swivelling joint to blowpipe. The bench light swivels down to carry a light to the blowpipe, or *vice versa.*

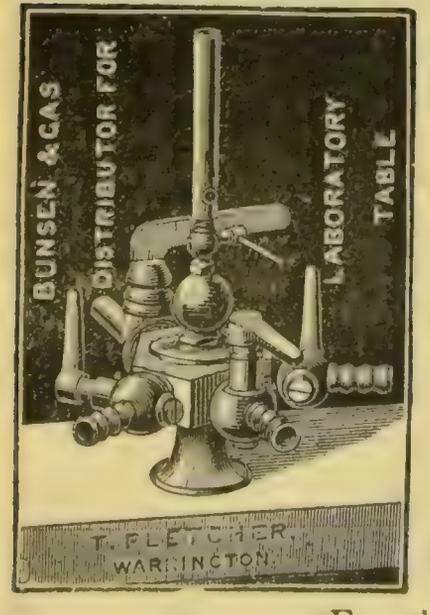
No. 1, Price 9s. 6d.

Extra jets **3d.** each.

The jet is removable, and any size can be supplied for use with either mouth or foot blower. Total height 8in. The flame can be directed at any angle, and can be set firmly by the wing nut shown at the back. The tap lever when pushed backward will turn the light out, when drawn forward will leave a small pilot light. The stand is of brass to prevent rust, and is heavy and perfectly steady.



No. 1.



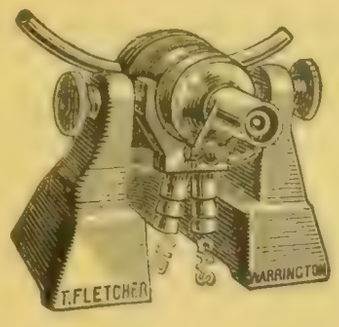
GAS DISTRIBUTOR FOR LABORATORY TABLES.

Price 12s. 6d. This, as shown in the engraving, is a brass pillar, with screwed pipe to pass through the table, taking its supply from underneath. On the top of the pillar is a small jet, which may be either used as a pilot jet for keeping a constant light, or can be converted into a small Bunsen by slipping the tube on, as shown in the engraving. The taps are fitted for rubber tubes, the one engraved having three $\frac{3}{8}$ taps and one $\frac{1}{2}$in.

For sizes of blowpipe jets see previous page.

F. R. & CO.'S COMPOUND BLOWPIPE.

IMPROVED PATTERN. **Price 60s.**



For Glass-workers, and Experimental Laboratories.
(See "Shenstone's Method of Glass Blowing," Rivington's).

A double concentric blowpipe, the gas and air changing automatically from the larger to the smaller blowpipe by the slight movement of the lever at the back, the same movement also adjusting both gas and air to each other for each blowpipe, giving the fullest and most instantaneous control over the character and size of the flame, without necessitating the use of the hands, the two blow pipes being perfectly concentric.

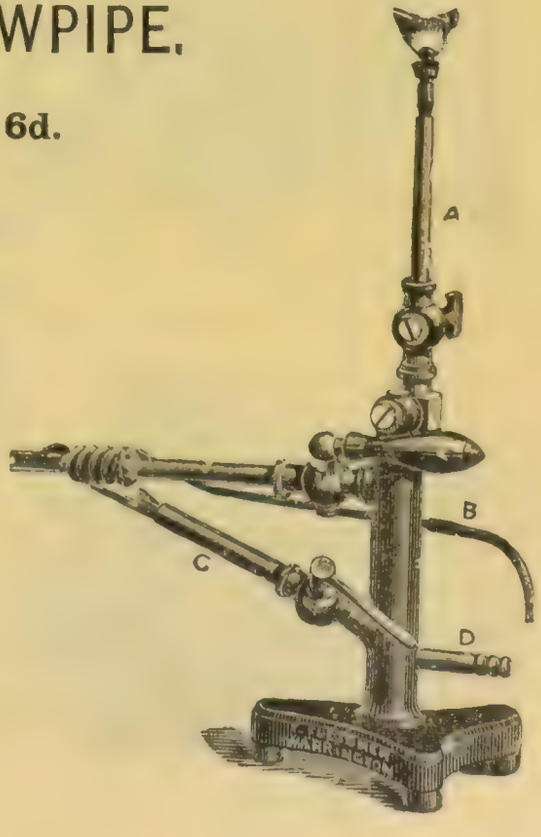
IMPROVED FORM OF FLETCHER'S ORIGINAL HOT BLAST BLOWPIPE.

Fig. 1 B., 18s. 6d.

For a large rough flame the Bunsen heater should not be used. The advantage of the hot blast shows only when a pointed flame is required having a high temperature.

Duplicate coils and jets, **1s. 6d.**

Engraved one-fifth full size.



Same pattern Hot Blast Blowpipe, only without the bench light, **14s.**

FOOT BLOWERS.

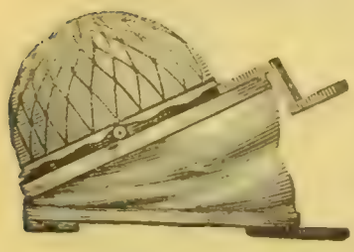


Fig 9

THESE ARE THE ONLY FOOT BLOWERS GIVING ABSOLUTELY STEADY AIR PRESSURES IN ALL POSITIONS. No. 3 is the most usual size for blowpipe work, and is generally used for autogenous soldering of lead chambers, being worked by the foot or under the arm, as most convenient. No. 5 for the larger injector furnace, Fig 41, and for large blowpipes. All patterns supply the air at a pressure of about 1¼ lb. on the square inch.

These blowers have proved themselves to be efficient, simple, strong, and able to stand hard and constant work. The pattern is now made in the following sizes :—

	Size over all, including step and air pipe.	Pressure in inches in water.	Pressure in ounces.	Size of air pipe.
Fig. 9. Size No. 3—Price 21s.	13 by 10 by 6½ deep	36 in.	20 oz. on sq. in.	⅜ in.
„ **No. 5—Price 27s.**	15 by 12 by 7 deep	36 in.	20 oz.	„ ⅜ „

Diameter of Air Reservoir, No. 3, 8 inches ; No. 5, 10 inches.

Fig. 9 B. Prices—No. 3, 25s. 6d.; No. 5, 30s.

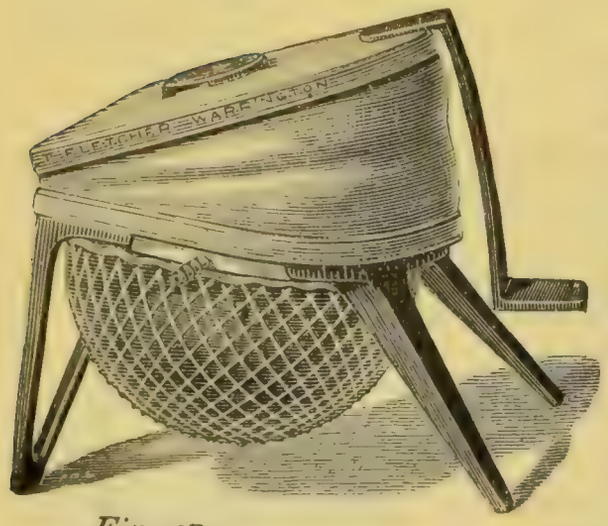


Fig. 9B.

This pattern, by reversing the position of the blower, reduces the risk of mechanical injury to the disc, and does away with the necessity for a wood casing or protection. It also prevents the valve from picking up dirt from the floor, keeping the whole arrangement cleaner, and the valves in more perfect order. Sizes as Fig. 9.

Extra Rubber Discs for No. 3, 2s. each ; Nets, 1s. For No. 5, 3s. ; Nets, 1s. 4d.

(2 rubber discs used on each blower).

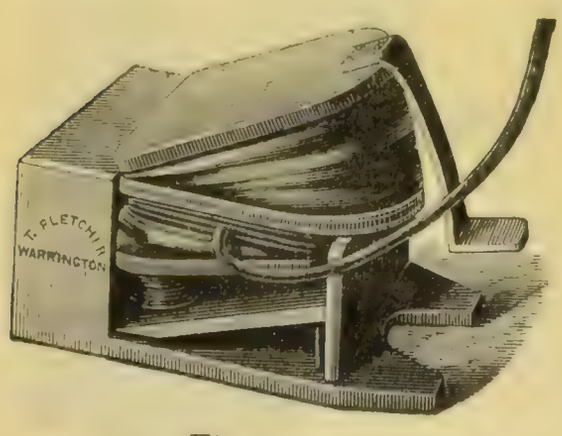


Fig. 9C.

Fig. 9 C.

With spring reservoir in place of india-rubber disc. Fitted for the roughest general use, but not giving steady pressures. Sizes correspond with Fig. 9.

Price, No. 3, 35s.; No. 5, 40s.

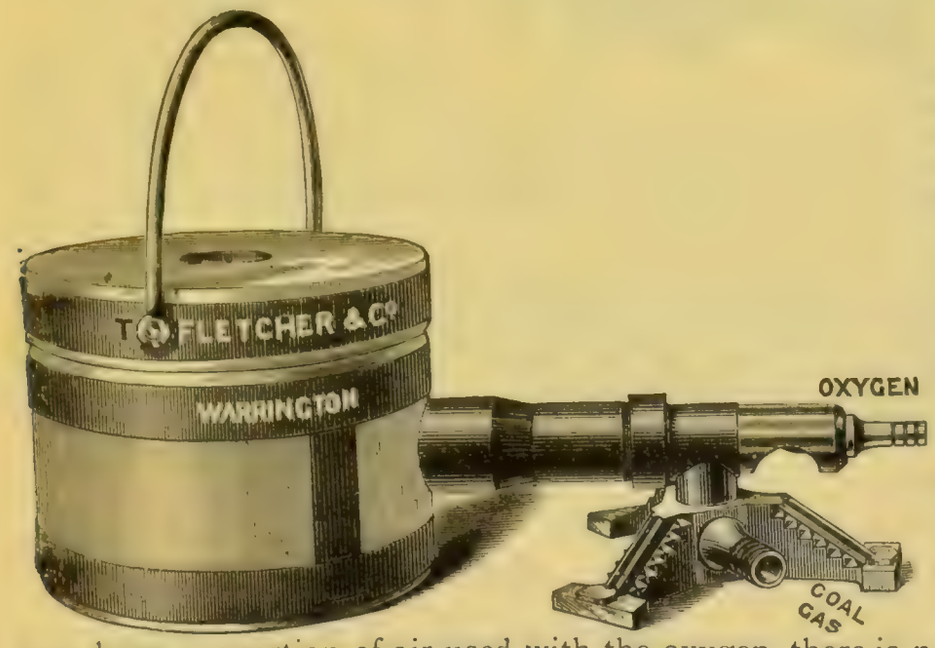
Unless for very rough usage, Fig. 9B is recommended in preference for all purposes.

F. R. & CO.'S

COMPRESSED OXYGEN INJECTOR FURNACE.

FOR THE

RAPID FUSION OF METALS AND THE TREATMENT OF REFRACTORY SUBSTANCES AT ALL TEMPERATURES.



This furnace is entirely self-acting. A very fine jet of Brin's compressed oxygen is first mixed with air, then with coal gas, the pressure of the oxygen being utilized to make this mixture and blow it into the furnace chamber at a high speed.

The quantity of oxygen used depends on the temperature and speed of working required, but under any circumstances is very small for the work done; and owing to the very large proportion of air used with the oxygen, there is no tendency to local heating or perforation of the crucible. The temperature is under the most perfect control from a red-heat to the almost instantaneous fusion of the most refractory crucibles.

The heat is perfectly steady without any attention; one oxygen cylinder 2ft. long and 6in. diameter will work the furnace for several hours without any attendance whatever.

The furnace casings are the ordinary well-known Injector pattern, but are lined with a specially refractory material to resist the very high temperatures, which are obtained with the greatest ease. The burner is of the simplest possible construction, and is not liable to damage or to get out of order. We cannot guarantee any casing against fusion if the furnace is worked at its maximum power. The price of extra furnace bodies is 5/-; extra lids, 2s. 6d.

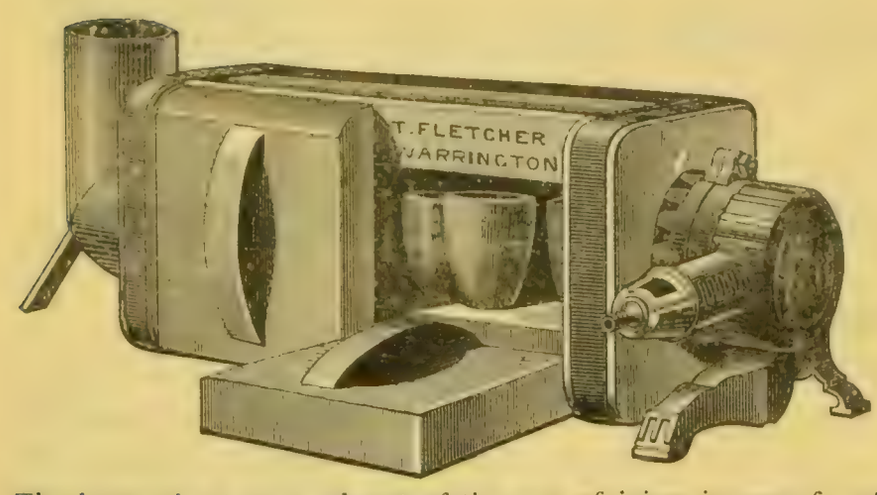
Prices—

Furnace and burner to take Morgan's oo Crucibles, **17s. 6d.**

" " " No. 1 " **19s. 0d.**

F. R. & CO.'S REVERBERATORY GAS FURNACES,

FOR CRUCIBLES, MUFFLES, CUPELS, &c.



One of these furnaces will do most of the general work of an ordinary laboratory. They work perfectly with chimney draught to a bright red—about the fusing point of fine copper and fine silver. With a blast they will work up to the fusing point of cast-iron. The furnaces can be made to take either two muffles at once, a number of crucibles, trays of cupels, or one muffle and crucibles or cupels at the same time.

The opening may be either at the side or the top, the furnace working either way equally well. The burner is at one end, out of the way of injury in case of accident to a crucible. Crucibles, cupels, &c., stand on the solid bottom of the furnace, perfectly steady and firm. When a blast burner is used a clay collar fits into the larger opening necessary for a draught burner, and the instructions for both draught and blast for the ordinary furnaces apply equally well to this, the burners being identical in principle with those of the previous patterns.

When used with the draught burner the blue cones of flame must be clearly seen on the burner, or if they disappear the gas supply must be increased, or the slide over the burner air tube closed until they reappear. In the latter case the furnace works with a smaller gas supply at a lower temperature, and by closing this slide and reducing the gas supply any temperature required can be obtained. If the adjustment of gas and air is neglected the burner grid becomes red hot and is quickly rendered useless. The grids will last for years if properly used.

No.	Floor Space in Furnace. Long.	Wide.	High.	Price of Furnace for Crucibles and Cupels.	
1 H	14in.	4in.	4in.	**70**/-	Muffle Doors and Stoppers 8s. each extra.
23 H	10in.	5in.	5in.	**70**/-	
33 H	14in.	5in.	5in.	**80**/-	Burner and Plug for Blast arrangement, 10s. 6d. extra.
6 H	14in.	6in.	$7\frac{1}{2}$in.	**90**/-	

1 H will take Five 2lb. crucibles at once, or Two muffles about 4in. wide by $4\frac{5}{8}$in. long by $2\frac{1}{4}$in. high.

23 H will take Two 6lb. crucibles, or Two muffles—3in. by $5\frac{1}{4}$in. by $3\frac{1}{8}$in.
33 H „ Three „ „ „ $4\frac{1}{8}$in. by $5\frac{1}{4}$in. by $3\frac{3}{8}$in.
6 H „ Two 12lb. „ „ 4in. by 7in. by $4\frac{1}{4}$in.

6 H requires a special burner when used for muffles or cupels—all the others work with the same burner for both purposes.

In ordering muffles, say if with slits for oxydising or plain for enamels and similar work.

	Clay.	Salamander.		Clay.	Salamander.
Muffle for 1 H	1/6	3/-	Muffle for 33 H	1/6	3/-
„ 23 H	1/3	2/3	„ 6 H	1/9	3/6

F. R. & Co's Perfected Injector Furnace.



Fig. 41.

For Metallurgists, Jewellers, Chemists, Manufacturers of Artificial Gems, and other purposes.

Works equally well with coal gas or air gas.

The small size can be used also with Kerosene or Petroleum Oil. See next page.

See tests made at the Exhibition of the Glasgow Philosophical Society, October 22nd, 1880.

POWER AND SPEED OF WORKING.—With ½-inch gas pipe and the smallest foot blower, the smallest furnace will melt a crucible full of cast iron scrap in 7 minutes, tool steel in 12 minutes, and nickel in 22 minutes, starting with all cold. With a foot-blower No. 5, cast iron can be melted in any furnace up to the 12lb. size. Tool steel or nickel in any up to the 6lb. size. Bessemer or gun steel in the smallest size. For higher powers or larger furnaces a Roots' Blower, driven by power, is necessary, and the air jet must be enlarged to about double the size which can be used with a foot-blower.

INSTRUCTIONS.

Gas	supply	required,	6oz.	size	furnace,	⅜in.	pipe=	7	to	30ft.	of Gas	per hour.
,,	,,	,,	2lb.	,,	,,	⅜in.	,,	= 10	to	40ft.	,,	,,
,,	,,	,,	6lb.	,,	,,	½in.	,,	= 25	to	60ft.	,,	,,
,,	,,	,,	12lb.	,,	,,	⅝in.	,,	= 30	to	70ft.	,,	,,
,,	,,	,,	28lb.	,,	,,	1½in.	,,	=100	to	300ft.	,,	,,

See that all gas taps have a large clear way through. High temperatures and rapid working require a free supply of gas. To adjust a new furnace to its highest power for the gas supply available :—Put the nozzle of the burner tight up against the hole in the side of the casing, turn on the full gas supply, light the gas in the furnace, and commence blowing, *before* putting on the cover of furnace, with the air way full open. If when the cover is replaced the flame comes out of the hole in the cover about two inches, the adjustment is right. If the flame is longer, enlarge the hole in the air jet until the proper flame is obtained, or reduce the gas supply ; if smaller, or not visible, screw in the air check until the flame appears. The larger the hole in the air jet provided the gas supply is sufficient—the greater the power of the furnace.

FOOT BLOWERS.—For a gas supply up to 40ft. per hour, blower No. 3 is sufficient ; up to 75ft. per hour, blower No. 5. For the 28lb. Furnace, Roots' smallest blower, driven by power. (For blowers, see page 518.) Roots' Blower is made and supplied by Thwaites Bros., Engineers, Bradford, Yorks.

Keep all fluxes away from the furnace jacket. Before stopping the blower draw the burner back from the hole. Commence blowing before the lid is put on the furnace. The blower Fig. 9 is liable to pick up dirt from the floor, throwing it against the gauze of the burner, and stopping the proper working of the furnace until cleared away. A thin layer of silver sand on the bottom will prevent crucibles adhering when at a white or blue heat. Crucibles must be heated very slowly the first time they are used, unless of the "Salamander" brand.

All internally fired casings crack the first time they are used, but should not alter afterwards.

F. R. & CO.'S PERFECTED INJECTOR FURNACE.

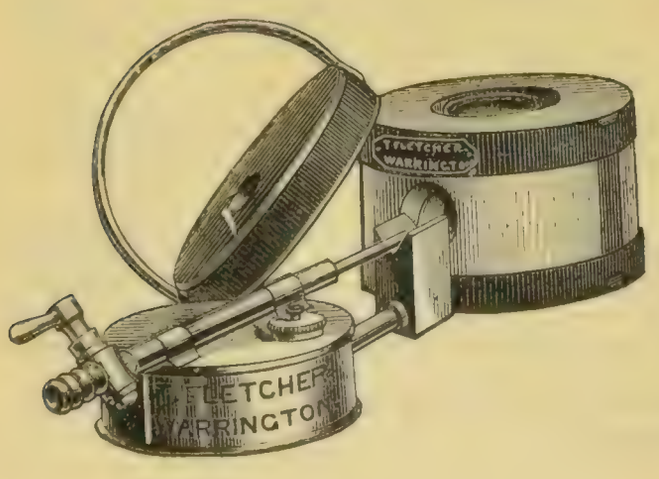
FOR DESCRIPTION SEE PREVIOUS PAGE.

Prices for furnaces taking crucibles of the following sizes:—

Crucibles No.——☞ (Morgan's.)	00	1	3	6	14
Price of Furnace	11/6	13/6	21/0	30/0	45/0
Size of Crucibles in inches, outside measure	$2\times2\frac{1}{4}$	$2\frac{7}{8}\times2\frac{3}{8}$	$4\times3\frac{1}{2}$	$6\times4\frac{1}{2}$	$8\times6\frac{1}{4}$
Capacity in lbs. iron	$\frac{1}{3}$	2	6	12	28
Foot Blower, Fig. 9b	25/6	25/6	30/0	30/0	Roots' Blower
India-rubber Tubing	3/0	3/0	4/0	4/0	
Price, complete, ready for use, with blower and tubing	40/0	42/0	55/0	64/0	
Extra Furnace Bodies	3/6	4/6	8/6	14/0	20/0
Extra Furnace Lids	2/6	2/6	4/6	7/0	10/0
Crucible Tongs	1/6	1/6	2/0	2/0	
Bow Tongs			3/0	4/0	
Crucibles, Fireclay	-/$1\frac{1}{2}$	-/2	-/5	-/10	2/4
,, Salamander	-/3	-/4	1/0	2/0	4/8

For the fusion of pure nickel over 6lbs. at once, a small Roots' blower, driven by power, is necessary and the air jets of the burners must be enlarged to double the size. The air supply of the 28lb. size must be controlled, if necessary, by a valve or large tap.

OIL FURNACE.



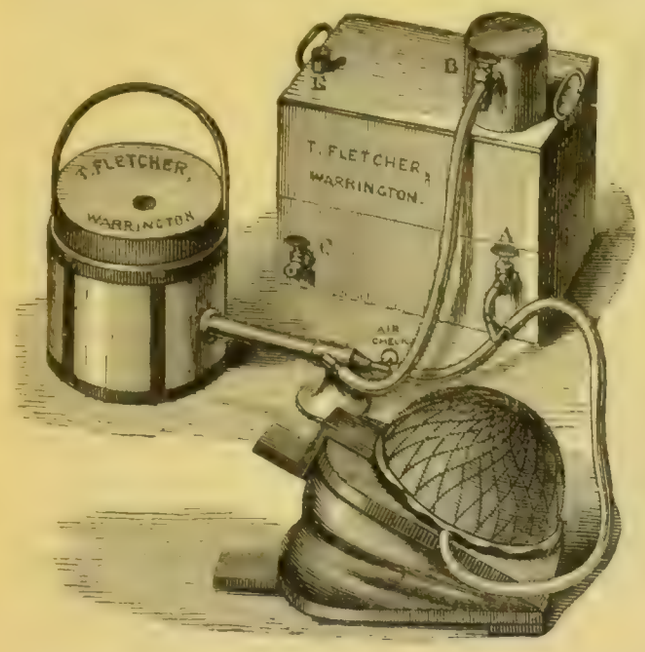
When gas or benzoline is not obtainable, the No. 00 size furnace can be supplied to work with a lamp burning ordinary Kerosene or Petroleum oil. In using this, the wick holder of the lamp must be placed close against the hole in the furnace casing. It is *inferior in power* to the other arrangements, but with a little experience in management, $\frac{1}{2}$lb. of cast iron can be fused in 12 minutes, starting all cold.

Price of furnace and lamp without blower and tubing 14s. 6d. Blower No. 3 is required.

A SIMPLE FURNACE FOR HIGH TEMPERATURES.

(Working with either Gas or Spirit Petroleum, without alteration, and with perfect results with either Fuel.)

The Injector Gas Furnace is also supplied with a small, simple, and perfectly safe arrangement for burning the vapour of gasoline or benzoline, giving a power and efficiency fully equal to that which can be obtained by a large gas supply. The arrangement is in every way as simple as when gas is used,



requiring no more trouble or attention. It equals a gas furnace in every respect, and in addition gives a heat of absolute purity, fitting it for the most delicate chemical operations where gas cannot be used owing to the presence of sulphur and other matters.

The ordinary pattern of Injector Furnace is used in precisely the same way as with gas, the only difference being that a branch pipe is taken out of the air supply and connected to the lower tap A on the generator, and a tube is carried from the upper tap B to the side tube of the Injector burner, marked "gas." The quantity of vapour required is adjusted by the lower tap A when the furnace is working, and the flame must be just visible at the hole in the lid, exactly as when gas is used, the instructions being precisely the same for both fuels. To charge the generator, pour benzoline, or gasoline, in the top hole until it overflows at the small tap C in the side, replace the cork firmly and close the overflow tap. It will then work for about ten to twelve hours at the full power of the Furnace.

Benzoline varies much in quality; it must, when a few drops are poured on a plate or the hand, evaporate quickly and completely, leaving no greasy stain, and if good will produce more vapour than the furnace can burn at its maximum power. All the tubing used must be perfectly smooth inside, or the power of the furnace is greatly reduced.

At the conclusion of an operation close both taps on the generator. It can then be left for any length of time ready for instant use. For ordinary meltings the generator can be used about thirty or forty times without refilling.

The No. 3 size will refine and perfectly fuse 6lbs. of chemically pure nickel so that it can be poured clean, using an open crucible, a feat beyond the capabilities of any other known furnace.

Benzoline often contains heavy oils. If the generator works badly, empty it and refill with fresh.

PRICES.

Generator only for No. 00 or 1 Injector Furnace, capacity 2lbs. metal, made in copper, **32s. 6d.**

Generator for No. 3 or No. 6 Furnace, made in copper, **52s. 6d.**

FURNACE, BLOWER, TUBING, AND GENERATOR, complete—

No. 1 size, capacity 2lbs. metal, **80s.** **No. 3 size,** capacity 6lbs. metal, **107s. 6d.**
No. 6 size, capacity 12lbs. metal, **117s. 6d.**

The engraving shows the No. 3 size Furnace, Generator, and Blower, as when in use. Scale, 1 inch to the foot. The foot-blower supplied with above is No. 5 (Fig. 9B page 518). Not the one shown on engraving. The Generator No. 3 size will work the 28lb. furnace, provided gasoline is used. If benzoline or spirit petroleum is used, an extra size generator is necessary. **Price £3 10s.** This size furnace requires a Roots' blower, smallest pattern.

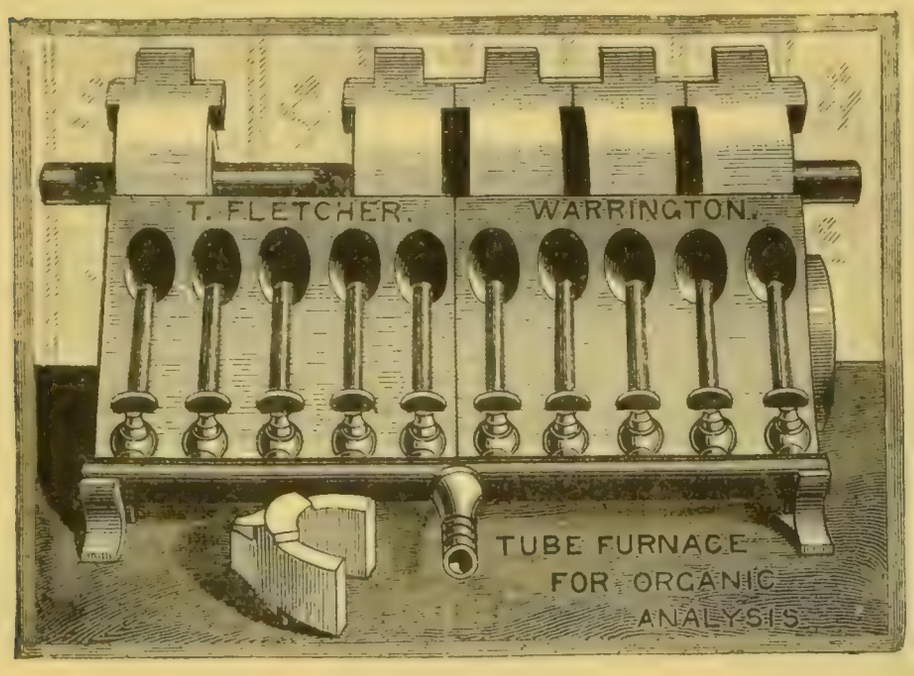
NOTE.—The Generator is useless except with a supply of air under pressure. It cannot be used with draught furnaces. If used for blowpipes gasoline is necessary; benzoline or spirit petroleum is little, if any, use for any blowpipes. Gasoline is far inferior to coal gas for blowpipe use.

GAS ENGINES—The Generators can be used with perfect success for producing gas for engines. For details, see "English Mechanic," December 25th, 1885, Art. 25148, Page 342.

F. R. & Co.'s Tube Furnace for Organic Analysis.

No. 2 PATTERN.

The special points about this furnace in which it differs from all others are, the burners are outside and in front of the furnace and clear from all falling dirt. There is no iron-work to rust, the whole of the metal used being brass.



The furnace body is in 6in. sections, and can be made up to any length without any obstruction, such as occurs when a long Hofmannfurnace is used with a short tube. It will take tubes 1in. external diameter.

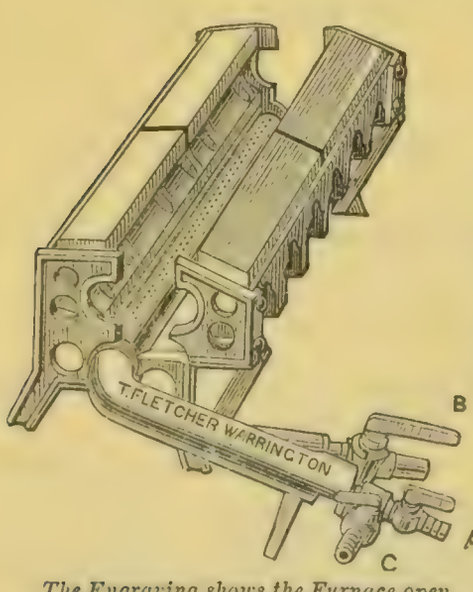
The burners can be made any length, and any part of them used, the blocks and covers are sold separately, and the burners can be supplied in sections of 6, 12, 18, 24, and 36 inches, so that any number can be used in a line without a break, enabling the furnace to be at once built up to any length required.

If a fixed length is required, any number of sections can be fixed permanently together.

It is free from smell in use. In other respects it is similar to the ordinary Hofmann furnace.

Price 4s. per inch.

F. R. & CO.'S TUBE FURNACES.



The Engraving shows the Furnace open ready for the introduction of a tube.

This will heat an iron tube of ¾ to 1 inch diameter to its softening point in ten minutes, using a small foot-blower: or it will heat the same tube to redness without a blast, the same burner being applicable for either draught or blast.

To use as a Draught Furnace, connect the tap A with the gas supply, closing both the other taps.

As a blast Furnace, connect B to a second gas supply full ½ inch bore, and connect C to a foot blower. When the blast is applied the tap A must be closed and the gas supplied only from B. In the pattern with adjustable length of flame, at the side of A, is a screw plug which adjusts the area of the gas jet without affecting the pressure of gas. The gas supply when used without a foot-blower must be adjusted *by this plug only*, and not with the tap, which must be full on. This plug adjusts the gas supply for varying lengths of flame, the length of the flame being altered by a sliding plug in the tube. On the end of the rod carrying the sliding plug is a tap which can be connected to an air supply for the purpose of cooling the part of the tube not exposed to the flame, preventing the heat spreading too rapidly by conduction.

The above can be used with air gas or coal gas.

PRICES.

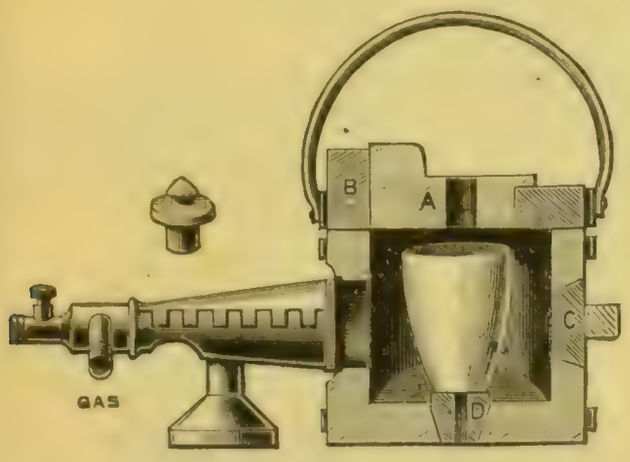
	12 in.	18 in.	24 in.
For draught or blast, with adjustable flame length	**40s.**	**42s.**	**50s.**
As above, without adjustable length of flame.. ..	**35s.**	**37s. 6d.**	**40s.**
With fixed length of flame, without blast	**25s.**	**30s.**	**34s.**

Extra non-conducting blocks, 6 inches long, 1s. 2d. each.

The Foot-blower No. 3, Fig. 9B, is the best for this furnace. Price, **25s. 6d.**

F. R. & Co.'s Lecture and Experimental Furnaces.

Price 37s. 6d.

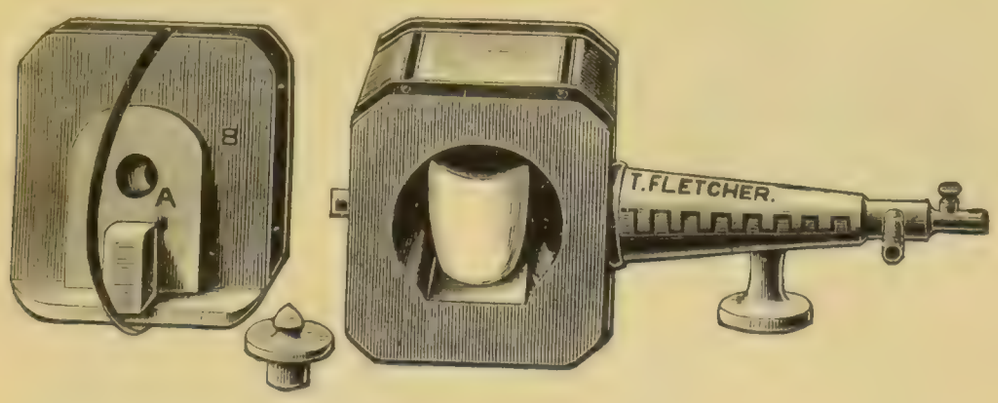


Working with the same burner as a draught or blast furnace at any temperature up to the fusion of the furnace casing, and adapted for Crucibles, Muffles, Tubes, Cupels, distillation by descension, treatment of refractory substances with gases, at high temperatures, small forgings, roasting ores, &c.

This furnace is specially designed for the lecture table, and has power and capabilities equal almost to any demands which can be made on it. It must be remembered that, although the power of the burner is almost without limit, it is not possible at present to supply any furnace casing which will stand excessively high temperatures, or the contact of fluxes, without damage. All parts of the casing can be supplied separately to make good any damage. Although not silent in use at the highest power, it is much less noisy than the Injector Furnace, and a lecturer with a good voice can be heard whilst it is working at full power.

POWER. When used as a blast furnace, as shown in Fig. 1, an empty crucible $2\frac{1}{2}$ by $2\frac{1}{4}$ inches can be raised to the fusing point of cast iron in two minutes, starting all cold.

When the plug C (Fig. 1) is removed and replaced by the chimney, the blower being stopped, it will raise the crucible to bright redness in about ten minutes. This requires the gas to be turned very low, and the adjustment of the gas as a draught furnace requires some little practice to obtain the best results. If the gas is in excess it



burns at the top of the chimney instead of in the furnace, and, of course, does no work. The best results are obtained when the gas is connected to the straight jet, but it will work as a draught furnace fairly well if the gas is connected at the side jet in the same way as when used for blast, but, of course, with a much smaller supply of gas.

LECTURE FURNACES.—*Continued.*

By turning the casing on its side, the contents may be seen by a class whilst the furnace is working, and it can in this position be used for crucibles, muffles, combustion tubes, cupels, or roasting; and with either draught or blast according to the temperature required.

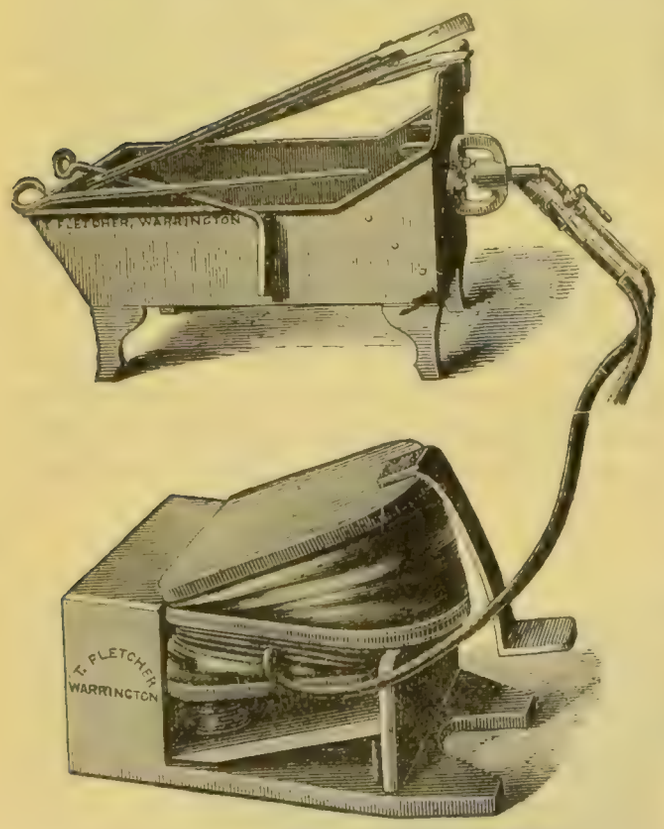
The plug D is perforated for distillations by descension, and when removed will admit of a one-inch combustion tube being passed through the furnace. When used with blast the instructions for the Injector Furnace must be followed, the only difference being that the Lecture Furnace is more silent, and about twice as quick in working. The crucibles are Morgan's Patent No. O size, and larger sizes must not be used.

NOTE.—When used with a blast and the air is in excess, the burner is liable to scream. If it does so, it is a sign that the gas supply is deficient for the blast used. When the lid is lifted, close the revolving burner slide. The price does not include crucible tongs.

Extra Muffles, fireclay, **9d.**
,, Crucibles, ,, **2d.**

Extra Muffles, Salamander, **1s. 6d.**
,, Crucibles, ,, **4d.**

F. R. & CO.'S GAS OR PETROLEUM FORGE.



AS USED AT WOOLWICH ARSENAL.

This simple arrangement is the only system by which steel tools can be forged without injury by the use of gas. It will be found a perfect arrangement for small odd forgings. It is perfectly clean, no nuisance either in lighting or use, and is always ready for instant use. Starting all cold, a slide rest tool can be repaired or shaped in two minutes.

Size of Hearth, 14 by 16½ inches.

The BLOWER No. 5, 9c is F. R. & Co.'s Foot Blower, dispensing with the use of the indiarubber disc, and fitting it for the roughest work.

It does not give so steady and powerful a blast as figure 9, or 9B, but it is adapted for forge or blowpipe use, and, not being fastened to the forge, both blowpipe and blower can be taken away and used separately for brazing, &c.

The blower, Fig. 9B, No. 5, is the best, if used with reasonable care. Fig. 9 is liable to damage with sparks, &c.

INSTRUCTIONS.

Fill the hearth with coke, broken small (cinders may be used, but are not so clean); light the gas at the blowpipe and use the blower. In a minute turn the gas out, and then turn on again a *very small quantity, not enough to burn at the blowpipe jet*, but sufficient to visibly brighten the fire. When the heat is obtained, the forge may be worked with or without gas, but a little gas doubles the power. THE GAS MUST NOT BURN AT THE BLOWPIPE JET EXCEPT FOR THE FIRST MINUTE. If gas is not available, the vapour from the smallest size Generator, page 523, may be used precisely in the same way as gas

The Blowpipe is the ordinary pattern, fig. 8C, and can be removed for use as a blowpipe, making the whole apparatus complete for all small heating and brazing work. If a hood is required, it will be made any shape desired, price about 6s. extra. It is not usually necessary if coke is used.

Price:—

Blower only, No. 5, 9c	...	**£2**	**0**	**0**	Hearth	**£0**	**15**	**0**
Do. No. 5, 9b	...	**1**	**10**	**0**	Tools, as shown in Engraving	**0**	**5**	**0**
Blowpipe ...	...	**0**	**10**	**6**	6ft. Indiarubber Tubing ...	**0**	**4**	**0**

This can now be supplied either as engraved or with the blowpipe arranged to give a top heat on the coke.

DRAUGHT CRUCIBLE FURNACES. Fig. 63.

FOR COAL GAS OR AIR GAS.

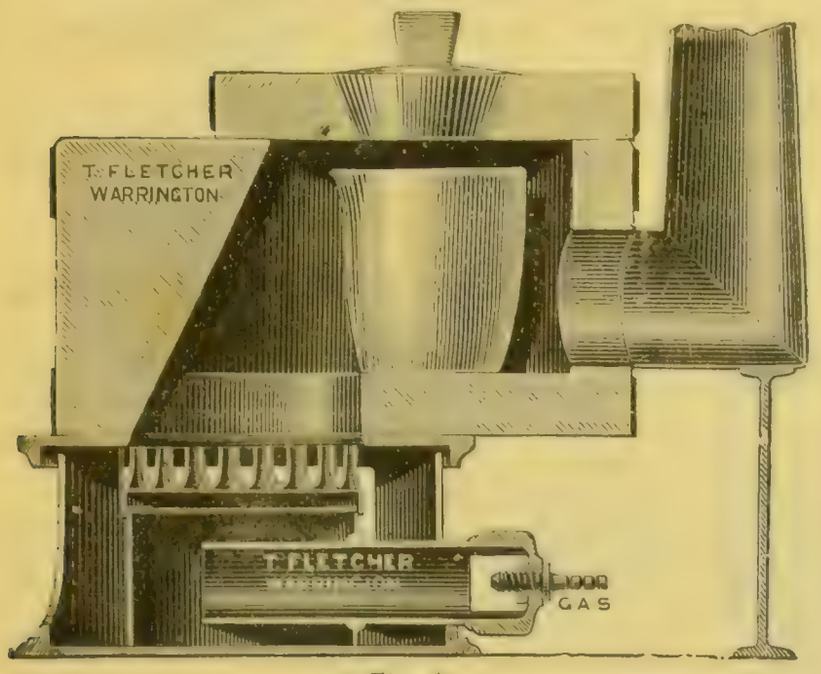


Fig. 63.

For Brass Casting, Jewellers' and general purposes. (Not for Cast Iron.)

No. 163, taking crucibles not exceeding 3 by 2⅝ in., to melt 2lbs. brass.

Price complete, £1 10s.

Extra crucibles, Salamander 4d., clay 2d., crucible tongs 1s. 6d. Extra grids for burners, 2s. each; extra gauzes, 6d. each. Gas supply required, 20 cubic feet per hour = ½in. pipe and tap.

No. 363, taking crucibles not exceeding 4 by 3½ in., to melt 6lbs. brass; gas supply, 25 cubic feet per hour = ½in. clear bore gas pipe and tap.

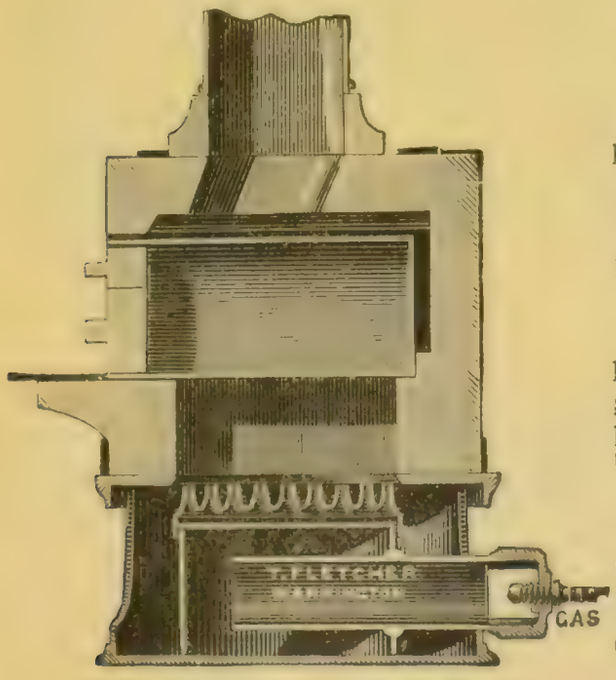
Price complete, £2 5s.

Crucible tongs, 2s. Extra Salamander Crucibles, 1s. each. Clay Crucibles, 5d. each. Bow Tongs, 3s. Extra Grids for Burners, 2s. each; extra Gauzes, 6d. each.

This pattern, in both sizes, can be used for oxidizing in cupels or shallow dishes, instead of a muffle furnace. The lid never requires to be lifted; it can be pushed sideways sufficiently to enable the crucible to be lifted out.

MUFFLE FURNACES,

FOR COAL GAS OR AIR GAS.



Muffle Furnace with Draught Burner, showing internal arrangement. *Fig. 61.*

No. 261.—Space inside Muffle, 2 in. wide, 2 in. high, 4 in. long. **Price** complete, **40s.**

Extra Muffles, Salamander, 1s. 6d.; clay, 9d.

Extra Grids for burners, 2s. each. Extra Gauzes, 10d. each.

The burner for this size is same as No. 163.

THE SAME ARRANGED AS A BLAST FURNACE for high temperatures. This requires about double the gas supply required for a draught burner. **Price** complete with injector burner, blower **No. 3, Fig. 9b,** and tubing, **68s. 6d.**

Gas supply pipe, ½in. bore.

For both draught and blast, **73s. 6d.** (both arrangements complete).

No. 461.—Space inside Muffle, 3⅞in. wide, 3in. high, 6½in. long. **Price** complete, **50s.**

THE SAME ARRANGED AS A BLAST FURNACE, as specified above, with blower **No. 5 Fig. 9b, 83s.**

For both draught and blast, **£4 15s.**

Extra Muffles—Salamander, 3s. 6d.; clay, 1s. 9d. Extra Grids for burners, 2s. each. Extra Gauzes 10d. each. Gas supply required for the draught burner, 60 cubic feet per hour, ⅝in. gas pipe and tap.

FURNACES—*continued.*

No. 661.—Space inside Muffle, 5⅜in. wide, 4½in. high, 9in. long. **Price** complete, **£4.**

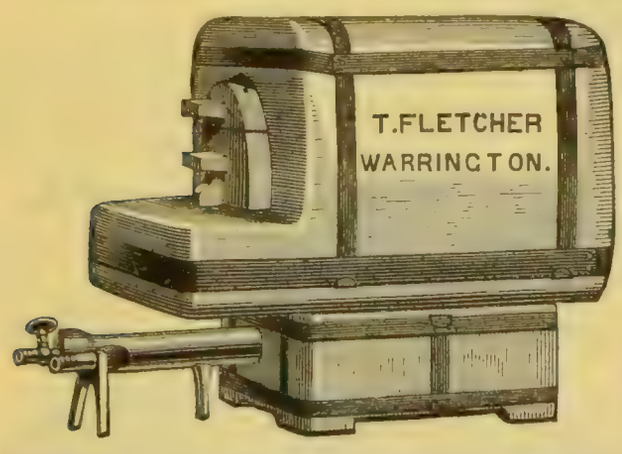
THE SAME ARRANGED AS A BLAST FURNACE as specified, with blower **No. 5, Fig. 9b, £5 13s.**

For both draught and blast, **£6 8s.** (both arrangements complete).

Extra Muffles, Salamander 6s., clay 3s. Extra grids for burners 2s. each. Extra Gauzes 10d. each.

No. 761, 6⅞ in. × 5⅞ × 11½ in. **£6.**

THE SAME ARRANGED AS A BLAST FURNACE, with blower **No. 5, Fig. 9b, £7 13s.**



Muffle Furnace, arranged for Blast, external view.

For both draught and blast, **£8 8s.** Extra Muffles, clay 5s. 6d.; Salamander, 11s. Extra Grids for burners 2s. each. Extra Gauzes 10d. each.

Gas supply required for the draught burner, 70 cubic feet per hour, ⅜in. clear bore gas pipe and tap. All prices include one fire-clay muffle. Gas taps with large way through, kept in stock.

NOTE.—The blast cannot be applied to these whilst working with draught, and with the blast arrangement the gas supply must be about double that specified for use with the draught burners. For instructions for blast arrangement, see Injector Furnace.

FROM THE JOURNAL OF THE SOCIETY OF CHEMICAL INDUSTRY, SEPTEMBER, 1889.

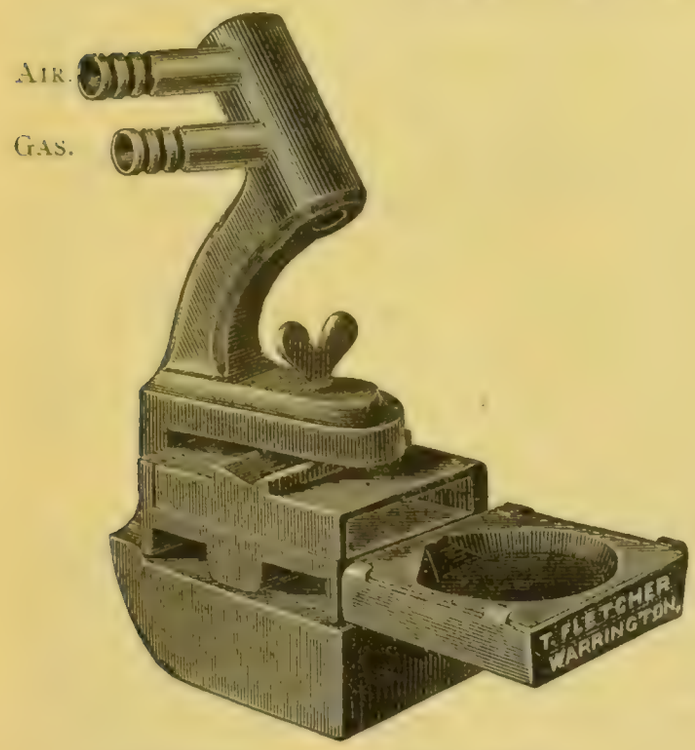
"The furnace used for cupellation is a muffle furnace, and, after having worked with many forms, we find that no furnaces are to be compared, both for accuracy in assaying and for ease and comfort in working, with Fletcher's gas furnaces. At Chester Assay Office a pair of these furnaces have been used for the last eight years, and have been found most satisfactory. The muffles are 9¾in. by 5¾in., and each muffle is capable of cupelling 32 gold assays at a batch (*i.e.*, of taking eight cupels, each cupel taking four assays.) With gold assays they burn 75 cubic feet of gas per hour, but with silver assays, where only 20 assays are cupelled in a batch, and the temperature is much lower, they burn from 50 to 55 cubic feet per hour. and with the price of gas at Chester (3s. 4d. per 1,000) they cost 3d. per hour for cupelling gold, and about 2d. per hour for cupelling silver. The number of assays made last year at the Chester Assay Office, from articles sent to be hall-marked, was 25,100."

GENERAL INSTRUCTIONS FOR DRAUGHT FURNACES.

The gas supply tap and pipe must be large and clear, so as to give as great a pressure of gas as possible at the burner nozzle, although the actual consumption of gas is small. The indiarubber tubing used must of necessity be perfectly smooth inside. The tubing made on wire, whether the wire is removed or not, *will not work these burners satisfactorily.* All Muffle Furnaces are sent out with a 2ft. 6in. chimney, having a cast-iron foot to enable it to stand steadily, and a short handle by which it can be readily lifted with the crucible tongs. The gas supply specified is required to work each Furnace at its full power, and the flame must be visible in the chimney. If the gas supply is deficient, the Furnaces can be worked at a lower heat by partially closing the top of the chimney until the flame becomes visible, or by working without the chimney. If the burner plate becomes red hot, it is a sign that the gas supply is deficient. The points of blue flame are always visible when the burner is looked into sideways, unless the gas supply is too small to work the Furnace satisfactorily. To light the burner without removing the upper part of the furnace, put a lighted taper through the burner casing up between the grooves in burner plate, then turn the gas on slowly. If the Furnace is hot it may be necessary to cover the air opening round the gas entrance to prevent the flame descending through the gauze at the moment of lighting. The burners can be easily taken apart, and must be kept clean.

F. R. & CO.'S NEW MELTING ARRANGEMENT.

ADDITIONAL PATTERNS.



Engraving slightly under half-size.

For melting gold or silver rapidly, without the use of a furnace. In this arrangement the two parts of the ingot mould slide on each other, to enable ingots of any width to be cast, and the blowpipe is part of the rocking stand. Connect the blower to the upper tube and the gas to the lower. When the metal is melted in the shallow crucible tilt the whole apparatus over so as to fill the ingot mould. A sound 3-oz. ingot can be obtained in about two minutes, and a 20-oz. in 5 minutes. Thousands of these are in use, and this arrangement is far superior to any furnace for small work. Very bulky scrap should be run into a mass in one of the moulded carbon blocks before being placed in the crucible.

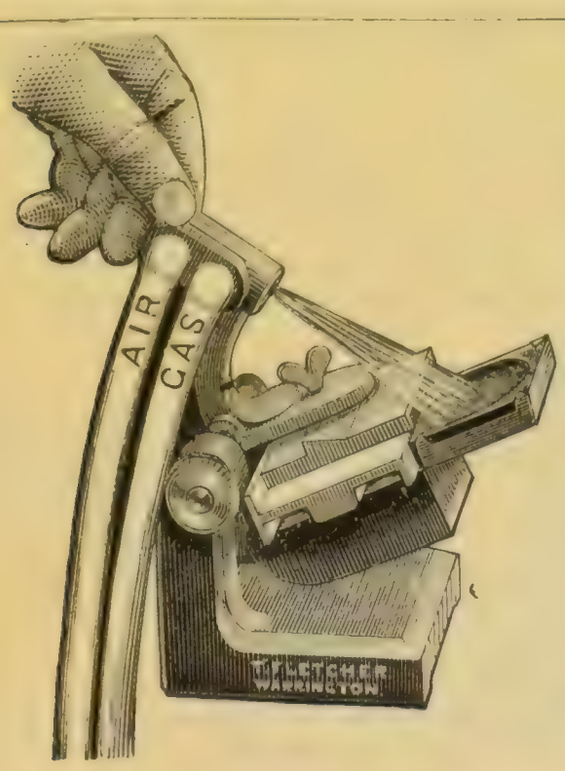
Price, as engraved, 3-oz. size, **13s. 6d.**

EXTRA CRUCIBLES, 4d. each; 3s. 6d. per doz.
Slides to carry the Crucibles 2d. each.

LARGE SIZE OF THE ABOVE.

To melt 14 ounces silver, or 20 ounces 18-carat gold, in 5 to 6 minutes.

Price 27s. 6d. Extra Crucibles **7d.** each. This requires a ½-inch gas supply and Foot Blower No. 5 size.



The same arrangement as the above, on heavy swivel stand, to prevent risk of pulling over by the weight of the rubber tube when not held by the hand. Small size only, for 3 ounce ingots. **Price 15s. 6d.** This addition is unnecessary in the large size.

Extra Crucibles 4d. each, 3s. 6d. per doz.

F. R. & CO.'S NEW LADLE FURNACES.

FOR LADLES, AND SET POTS.



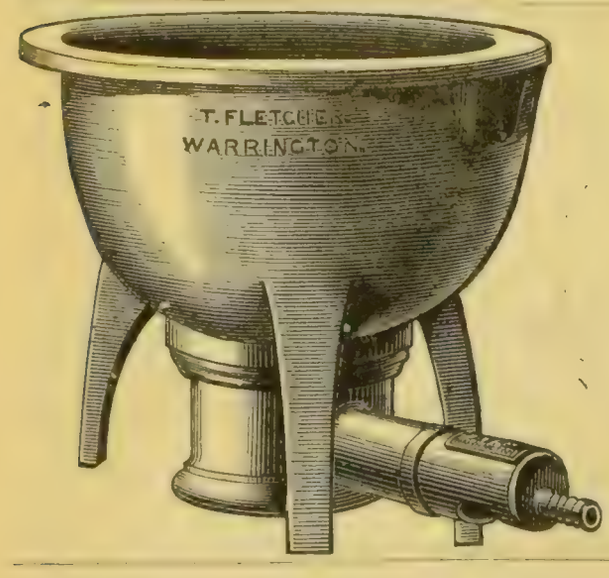
Small Size, for 7 in. ladles.

A new and substantial form is now made in three sizes. The two smaller sizes take the No. 4 High Power Burner, the largest requires the 6 in. High Power Burner.

The smaller size, taking ladles 7 inches in diameter, is made for ladles only. The burner will heat soldering irons, or boil water quickly, and is useful in many ways. **Price** complete **13s.** without ladles, but including a metal skimmer and hook for lifting the lid. The body and lid are arranged to admit the handles of different size ladles at different heights, to enable them to be kept perfectly level.

No. 2 Size Furnace is made to take ladles 8¼ inches wide, 4½ inches deep, outside measure. **Price,** complete with ladle bowl without handle, **20s.** Special handles to order.

No. 2 Size, B Pattern.—The same furnace with side flue and set pot for stereotypers, &c., to use with a small dipping ladle, and safe against splashes of metal on the burner. These can also be used as lead baths for tempering tools and similar work. **Price,** complete with set pot, as engraved below, and with a lid which fits the furnace, with or without the set pot, **22s. 6d.**



No. 3 FURNACE FOR SET POT.

No. 3 Size Furnace, taking set pot 12 inches wide, 7½ inches deep, to hold 1 cwt. solder, or stereo metal, which can be readily melted in 1 hour starting all cold.

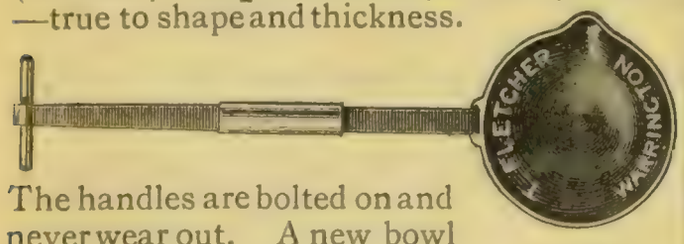
Price, complete with set pot and burner, **28/6.** No lid or stand is supplied with this size.

No. 3 size requires a ¾ inch clear bore pipe and tap, and is not made to take ladles which require a support over the burner.

It is desirable that this size furnace should stand under a hood to remove the burnt gas from the room unless it is well ventilated.

F. R. & CO.'S NEW ZINC AND LEAD LADLE.

These ladles are made with both cast iron (for lead) and malleable (for zinc) bowls —true to shape and thickness.



The handles are bolted on and never wear out. A new bowl can be fixed in a few minutes.

The handles ensure perfect steadiness in pouring, and are ALWAYS COLD; the sliding handle being pushed to the cool end whilst the metal is being heated.

The bowl is 7 inches in diameter, and fits both old and new pattern small size ladle furnace.

Price, *with cast-iron Bowl* **4s.**; *with malleable Bowl* **6s. 6d.** *Extra Bowls; cast,* **1s. 3d.**; *malleable,* **3s. 9d.**

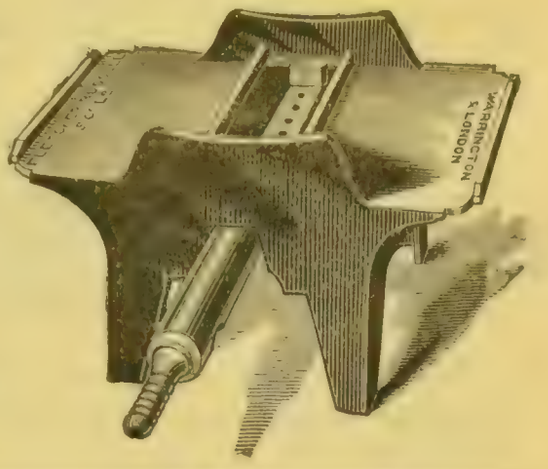
SHOEMAKERS' TOOL HEATER.

This arrangement has been specially designed for the SHOEMAKING TRADE, taking all the Tools used in the Trade, and Heating them in the most economical manner.

Size of Top over all, $8\frac{3}{4}$-in. by $5\frac{1}{4}$-in.

PRICE 4/6.

This will be found useful also for Bookbinders, Pursemakers, Heating Curling Tongs, &c.



F. R. & CO.'S TINMAN'S FIRE POTS.

These are new and substantial patterns, specially designed for workshops where coke stoves cannot be used.

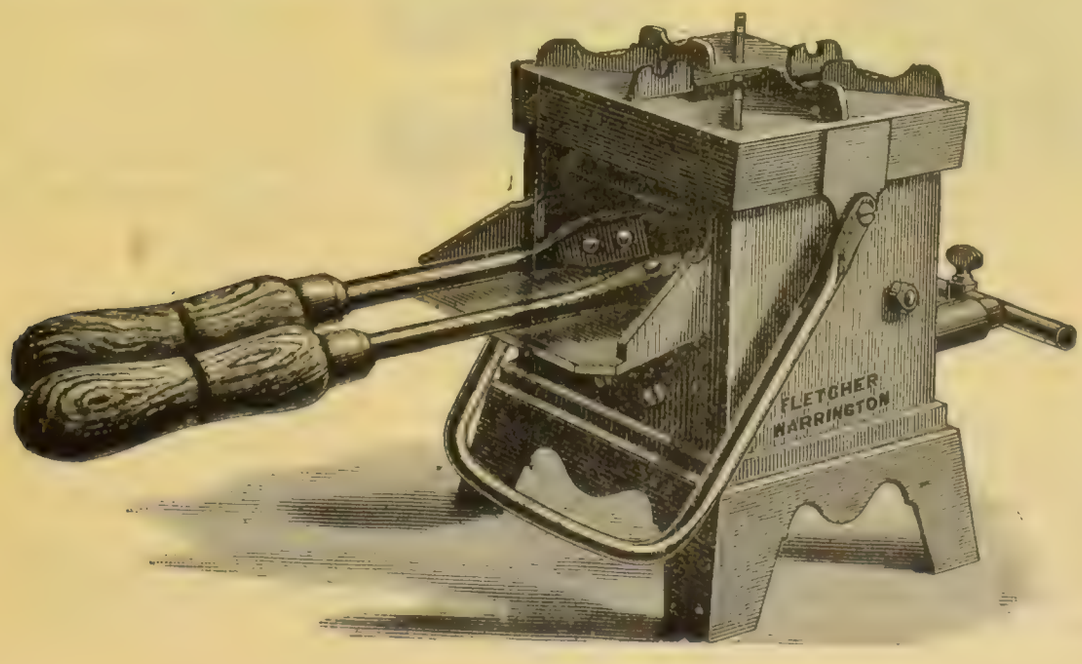
Each stove will heat rapidly either one or two large copper bits, and the waste heat after leaving the copper bits can be used for boiling breakfast cans, &c.

The top can be opened by a hinge and the stove used for heating ladles, making solder, or tinning.

The swing handle enables the stove to be carried about by case makers, &c., and the apparatus will be found a thoroughly good and practical workshop tool for permanent hard use.

Small size, for two 3lb. straight bits, price **16s.** Lead Pot, to fit, holding 20 lbs. of lead or solder, **3s. 3d.**

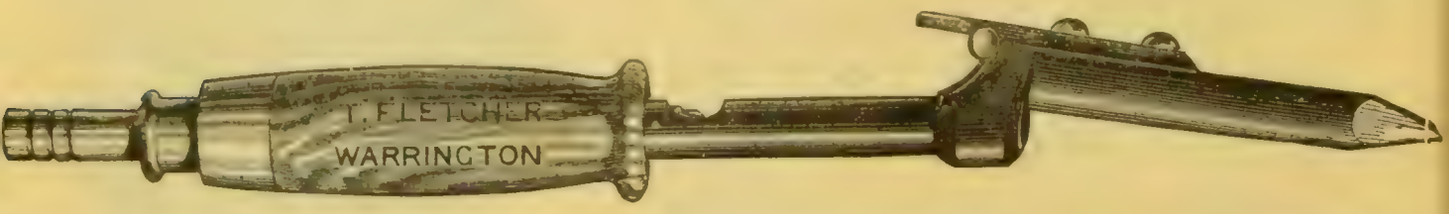
Large size, for two 7lb. straight or hatchet bits, price **22s.** Lead pot, to fit, holding 30 lbs. of lead or solder, **3s. 9d.**



F. R. & Co.'s Registered Self-Heating Soldering Bit.

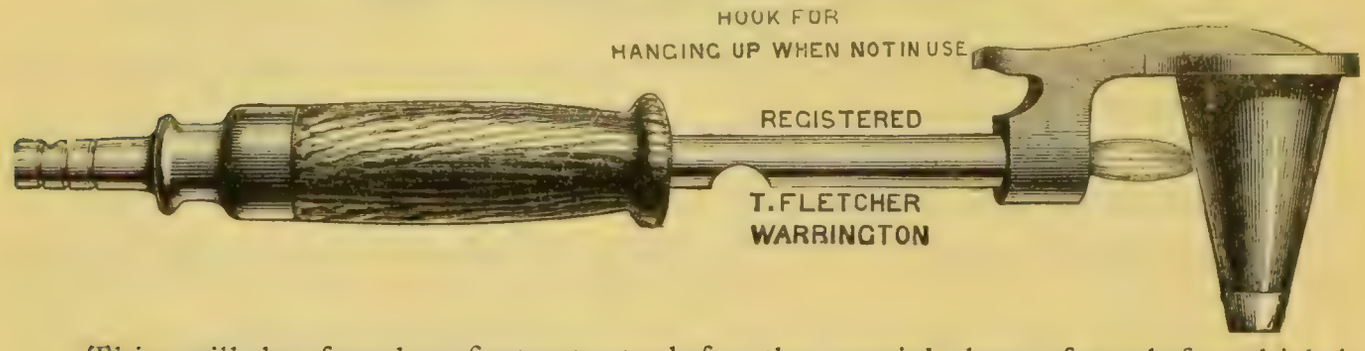
This is free from smell, heats rapidly, and will be found a first-class arrangement for case makers, stained glass leading, sardine box making, and similar work.

It is not suited for the heaviest class of coppersmith's work.

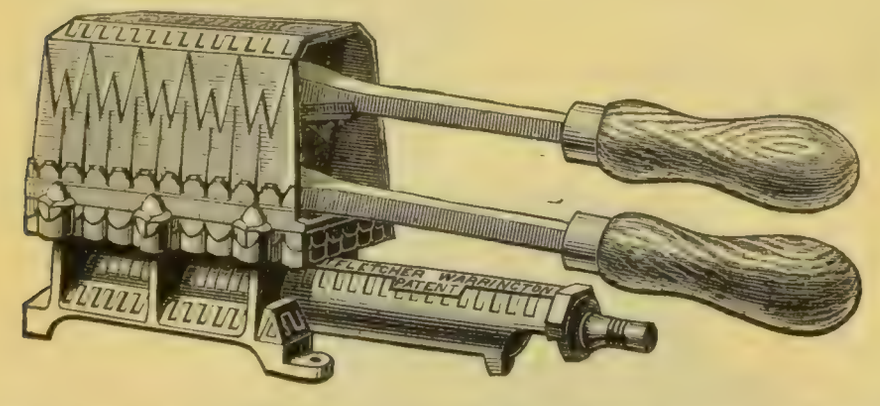


The copper can be renewed in a minute when worn down. The gas supply from an ordinary bracket, with the gas burner removed, will be found ample. **Price, 6s.**

F. R. & CO.'S REGISTERED SELF-HEATING SOLDERING BOLT FOR LEADED WINDOW MAKERS.



This will be found a first-rate tool for the special class of work for which it is designed, requiring very little gas, and being fully equal to the requirements of the quickest workman. It is cool to the hand, and perfectly clean in use. **Price, 6s. 6d.**



12 S. Price 3s. 6d. The same as 10 S, with cover for soldering bolts. This will heat two heavy bolts at once with one burner.

The same burners in sets of 2 or 3, on cast-iron stand, with tap to each burner, **7s. 6d.** per burner.

PLASTIC FIREBRICK.

FOR ALTERING AND LINING FAULTY FIREPLACES WITHOUT REBUILDING, AND REPAIRING LABORATORY FURNACES.

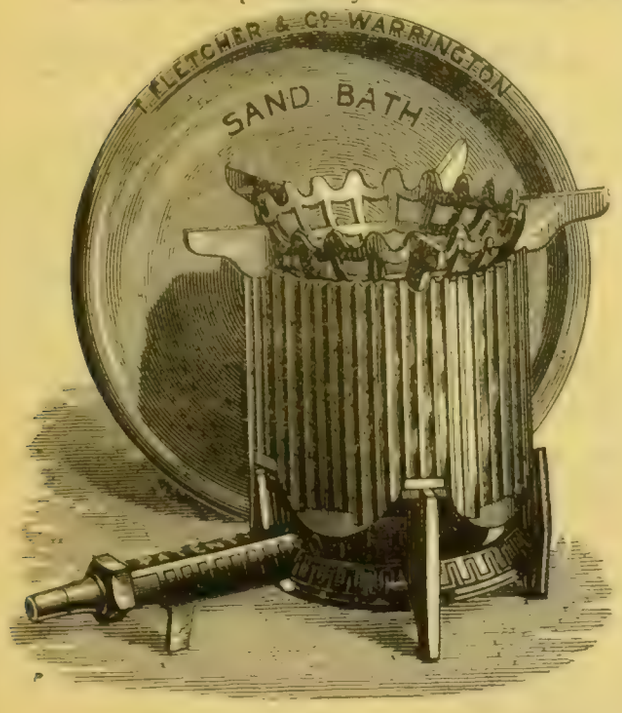
Can be made by mixing liquid Silicate of Soda with ordinary Fireclay to the required consistency.

Silicate of Soda, in any quantity, 3d. per lb. Package of any quantity under 28lbs., 1s. extra. In 5 cwt. casks, at a lower rate.

The mixture ready prepared for immediate use, 14 lb. tin, 5s.; 28 lb. tin, 8s. This will not keep soft more than a few days.

This sets hard without requiring to be burnt in a kiln. If a thick body is required for filling up or altering fireplaces, the space should be filled with broken bricks, and the Plastic Firebrick used only to cement and fill up the crevices, so as to form a good smooth face.

NEW LABORATORY BURNERS.



There are probably few chemical or physical laboratories in the world where the well-known low temperature burners are not in constant use. The New Laboratory Burners serve a similar purpose, but with a much wider range, and without any liability to damage with the roughest use.

The stand for vessels will carry round glass flasks, porcelain dishes, or flat-bottomed vessels of any size with perfect steadiness.

The vessels can, by lifting the cylinder, be placed at different heights above the flame, which will burn steadily when turned down to its lowest point.

A SAND BATH can be supplied with each.

These Burners are made in four sizes.

No. 10.—Price, **4/-**. Porcelain Enamelled, **6/3**. Sand Bath, **1/2** extra. Porcelain Enamelled, **2/6**. Height adjustable from 6½ to 7½ in. Support for flasks, 4¼in. diameter, 1¼in. deep, and for flat vessels, 6½in. diameter. Sand Bath, 9in. diameter, 1in. deep. Gas consumption per hour, maximum 10 feet, minimum 1½ feet.

No. 15.—Price, **5/-**. Porcelain Enamelled, **8/-**. Sand Bath, **1/6** extra. Porcelain Enamelled, **3/-**. Height adjustable from 7 to 8in. Support for flasks, 5¼in. diameter, 1½in. deep, and for flat vessels, 7½in. diameter. Sand Bath, 10in. diameter, 1in. deep. Gas consumption per hour, maximum 15 feet, minimum 2 feet.

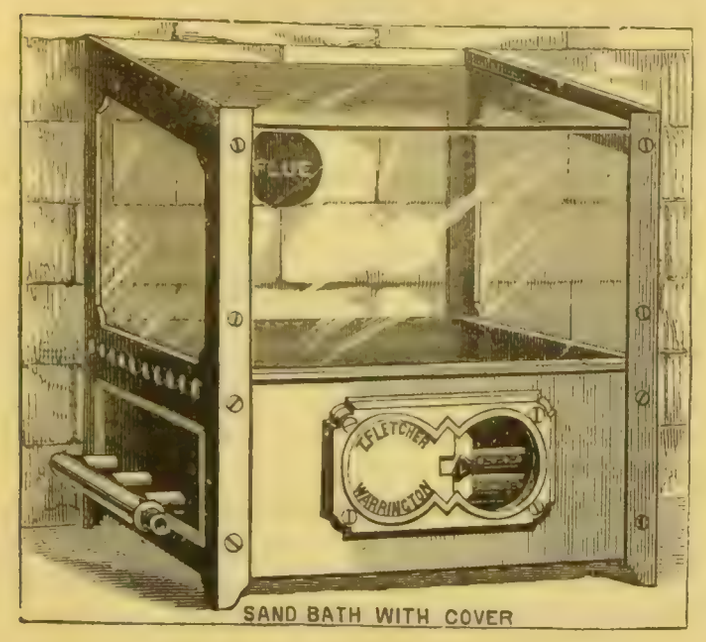
No. 20.—Price, **7/-**. Porcelain Enamelled, **11/7**. Sand Bath, **2/3** extra. Porcelain Enamelled, **4/9**. Height adjustable from 8 to 9in. Support for flasks, 7in. diameter, 1¾in. deep, and for flat vessels, 9in. diameter. Sand Bath, 13in. diameter, 1in. deep. Gas consumption per hour, maximum 20 feet, minimum 3 feet.

No. 30.—Price, **17/-**. Porcelain Enamelled, **24/-**. Sand Bath, **3/-** extra. Porcelain Enamelled, **6/6**. Height adjustable from 9¼ to 10¼in. Support for flasks, 8in. diameter, 2 in. deep, and for flat vessels, 11in. diameter. Sand Bath, 15in. diameter, 1in. deep. Gas consumption per hour, maximum 30 feet, minimum 1½ feet. This size has two concentric burners, with separate taps to each.

The burners are our stock patterns of Standard Burners, and can be used separately for quick boiling.

GOVERNORS.—It is not generally known that a good governor placed on the whole gas supply of the laboratory makes it possible that exact work may be carried out, and that very close temperatures may be obtained for long periods without any attention whatever.

The use of a good governor along with these burners will be found to simplify many operations in the laboratory, which, under ordinary circumstances, are almost impossible without very complicated apparatus and constant skilled attention.



SAND BATH WITH COVER

SAND BATH, FOR LABORATORY USE.

WITH COVER FOR EVAPORATING CORROSIVE LIQUIDS.

Size of bath, clear inside, 12 inches square.

Price, with Tap to each burner, so that the temperature may be controlled in any part, **45s.** The back is open, to fit against a wall with a flue.

SUNDRIES.

JEWELLERS' SOLDERING COALS.—Made of compressed willow charcoal (same as moulded carbon blocks). **Size 2 x 2 x 6** inches, with flat sides. **Price 1s.** One of these will last out 50 blocks of charcoal. **Size $1\frac{1}{2}$ x $1\frac{1}{2}$ x 5** inches. **Price 6d.**

MOULDED CARBON BLOCKS for supporting small work under the blowpipe. Cleanly, perfect non-conductors, and everlasting. **Price 1s. 6d. each.** (For use with small blowpipes only.) These are circular, hollow on each face, and 4 inches diameter.

FINE WILLOW CHARCOAL, in sticks, free from flaws (selected sticks only), 1s. per lb.

IN ORDERING if the exact apparatus required cannot be specified, the work to be done should be precisely and minutely explained. Size of blowpipe jets should be stated.

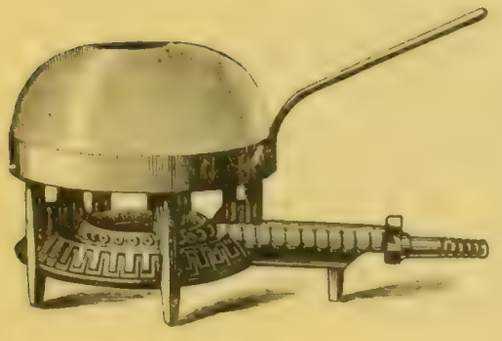
ALL INDIARUBBER TUBING used must be SMOOTH INSIDE, made without wire, and of as large a bore as can conveniently be used.

RUBBER TUBING, $\frac{5}{16}$-inch, $4\frac{1}{2}$d.; $\frac{3}{8}$-inch, 6d.; $\frac{1}{2}$-inch, 9d.; $\frac{3}{4}$-inch, 1s. per foot. See also page 503.

IF THIS LIST IS THREE MONTHS OLD please apply for a fresh one before ordering, as constant improvements are being made, and new apparatus being designed.

Rules for the selection of apparatus for special purposes, and Hints as to Management will be found in "Coal Gas as a Fuel," by Thomas Fletcher, F.C.S. **Price 1s.** post free.

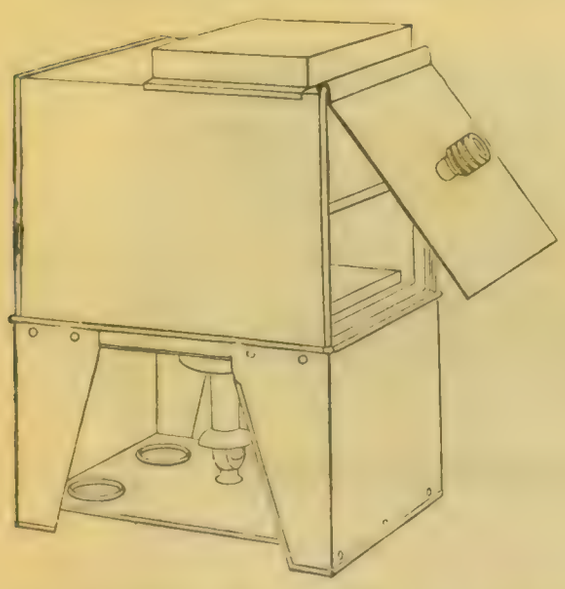
PLATE DRYER AND HEATER FOR DENTISTS' USE.



This consists of a porous fireclay dome, resting on one of our No. 10 standard burners, size of dome inside, 4in. diameter, 2in. deep. It will take work up to 3 inches diameter, and will heat a block of iron over 1lb. weight, to clear redness with the ordinary burner as engraved, without the assistance of a blowpipe or blast of air.

	s.	d.
Price, Burner	**1**	**10**
,, Dome	**4**	**0**
,, Complete	**5**	**10**

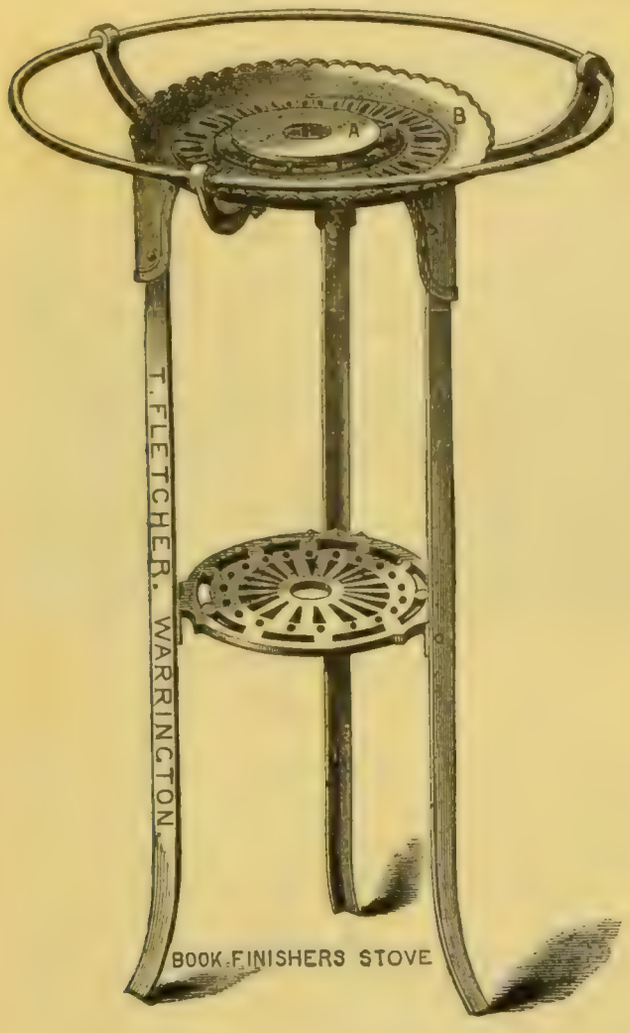
DRYING OVEN WITH WATER JACKET.



Specially designed for Dentists' use, size 6 inches wide, 5 inches high, 8 inches deep, clear inside measure. This is made of heavy copper throughout, rivetted and seamed, and designed for heavy continuous work. Hanging door, two sliding shelves of copper, plate over the water filling hole, of tinned copper, hammered and polished, for warming rubber for packing.

Price, complete, with burner and copper stand, **42s. 6d.**

Smaller sizes to order at the same price, larger sizes at a small additional cost. These are made in the most substantial manner possible. Cheap or lightly made water jacketed ovens are worse than useless for permanent service, being constantly out of order.



Book Finishers' Stove.

The pattern illustrated has been designed after a careful examination into the requirements of the trade, and will be found everything that can be desired. Wood handles cannot be burnt, and the largest rolls can be heated evenly and quickly over the centre hole, *through which the whole of the waste heat rises.* The Letter-plate can be removed, so as to heat a large glue pot, and if this boils over very little mess is made.

Price—As engraved, on tall stand, **30s.** The same with short stand for use on a bench, **20s.** The same with short stand, without the outer wrought-iron ring, for use in small shops and confined spaces, **14s.**

This stove is in practical use in some large establishments, and is stated to be perfect in every respect.

NEW DRYING AND STERILIZING OVENS.

A complete series of these is now in preparation. They are specially designed for the various conditions required in the Chemical Laboratory, and also for pharmaceutical use, bottle and powder drying, &c.

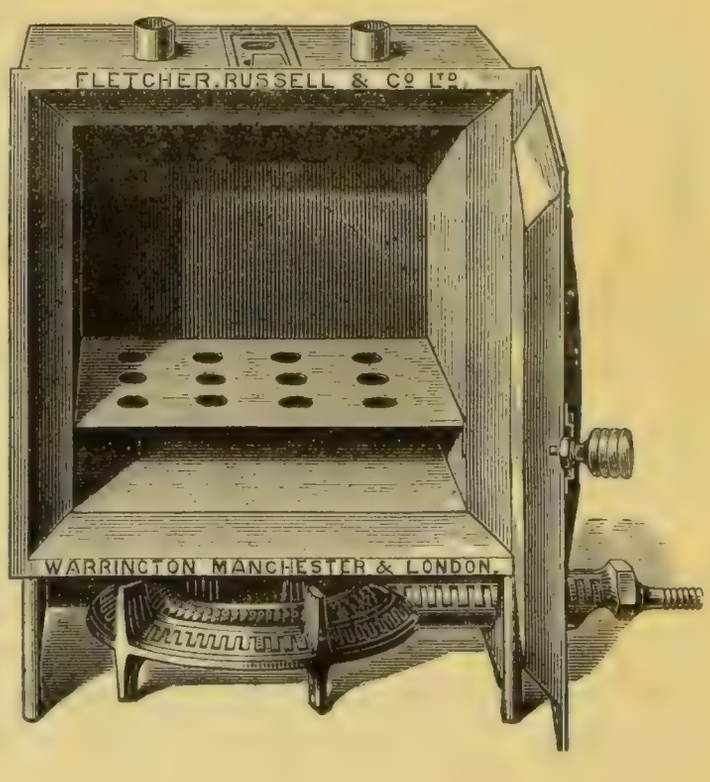
In ordering, the required maximum temperature must be specified.

Sterilizing and Drying Oven for Breweries and Bacteriological work, working up to 400° F.

Size clear inside, 9 in. high, 9 in. wide, 7 in. deep.

Price in strong tinned Iron, £2 2s.
Price in strong Copper, for use in places liable to damp or rust, £3 3s. 0d.

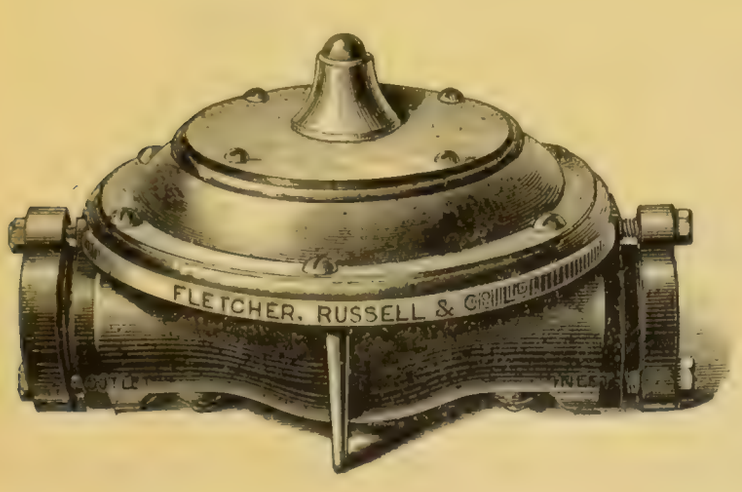
Other sizes and patterns in preparation.

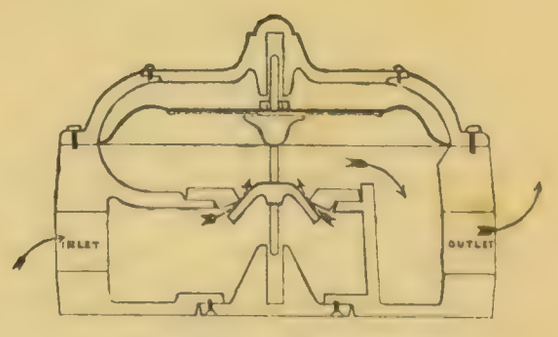


NEW GAS PRESSURE GOVERNORS

FOR EQUALISING THE SUPPLY, AND PREVENTING WASTE AND IRREGULARITY.

The use of a good governor on every gas service is absolutely necessary, if waste is to be prevented. It is well known that the light given by the gas in any burner *decreases* as the pressure increases, and the waste from this source is very considerable on an ungoverned service. This is entirely prevented by a good governor, which allows of the maximum of light with the minimum of cost.





Section of Governor.

The same remarks apply also to cooking and heating. A regular supply of gas is necessary for cooking if the work is to be well done without unnecessary attention and waste.

NEW GAS PRESSURE GOVERNORS.—*Continued.*

Gas fires are frequently very extravagant on an ungoverned service, as the waste heat and gas are carried up the chimney unnoticed; and in addition to this excessive pressure of gas causes many fires to be unpleasantly noisy.

These governors are sent out adjusted to about 8/10 pressure, which is the best and most economical for general use, provided the gas pipes and meter are not too small for their work. If this is the case, any pressure can be obtained with perfect regularity by unscrewing the top cap of the regulator, and adding extra weights on the disc. These weights can be supplied adjusted to any required pressure up to that of the main service.

PRICES.

For ¾-inch bore gas pipe	**17/6**
,, 1-inch ,, ...	**27/6**
,, 1½-inch ,, ...	**45/-**
,, 2-inch ,, ...	**70/-**

These governors with the exception of the ¾ in. size, which has a screwed joint, are made with gland screws, which renders their fixing a very simple matter. They must be fixed on the outlet pipe near the meter, and must be perfectly horizontal. If not quite level, they are liable to work unsteadily.

In some cases the leather used becomes less pliable after some years' use; but as the leathers can be supplied at a small cost, and all easily replaced without removing the regulator, this is not of much importance.